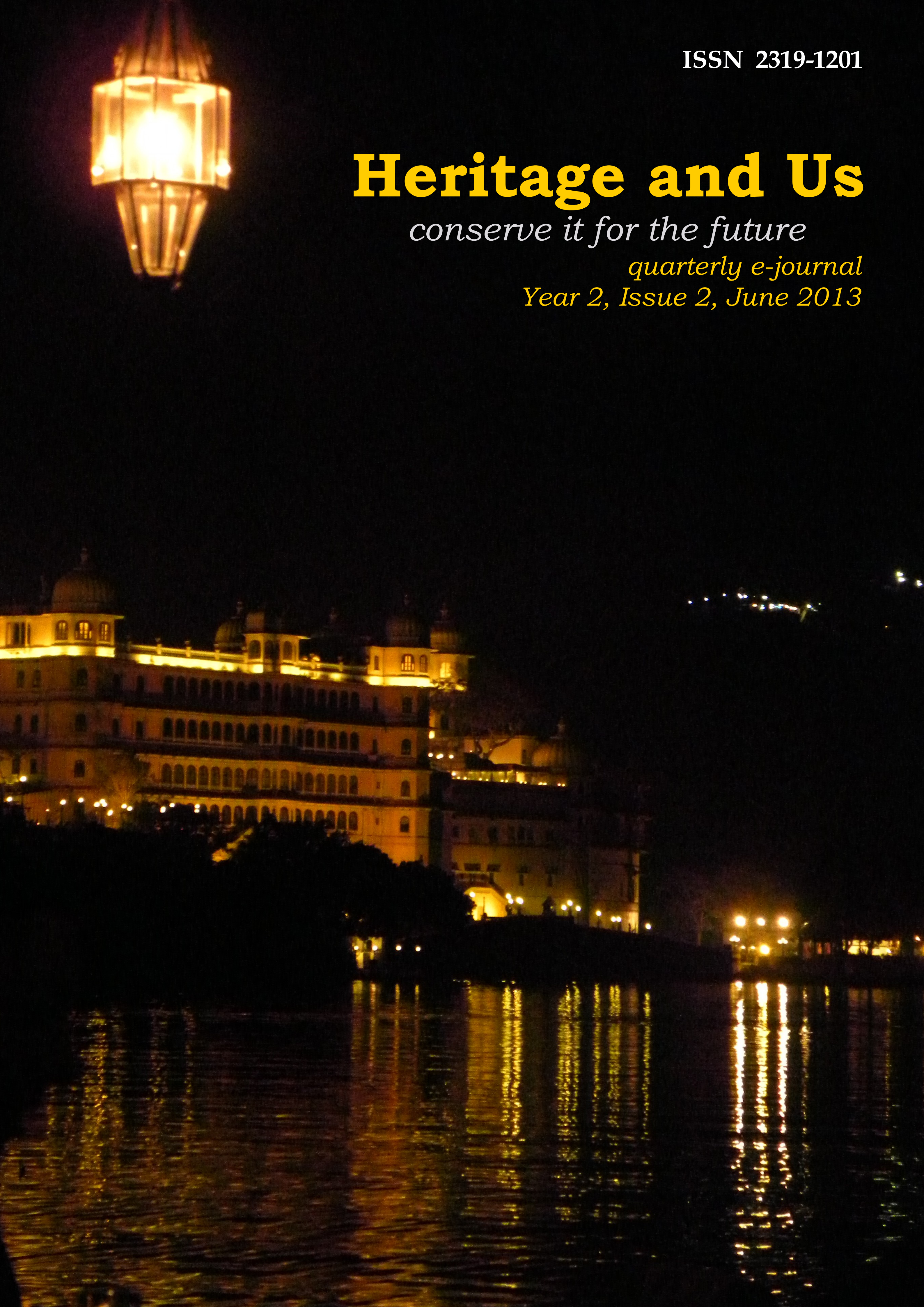
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Front Cover: Umaid Bhawan Palace, Udaipur
Back Cover: Bronze Image of Tara, Bihar

CONTENTS

EDITORIAL

Dear friends,

It is a sad phase for all of us. Our monuments are vanishing, our archaeological sites are being plundered and our old customs and traditions are dying a silent death. Recent reports have showed that since independence, hundreds and thousands of monuments in India have already been lost. But have we ever thought why it is happening? Why we have become least concerned about our heritage properties? The answer is lack of awareness. Now the time has come when we all have to become conservators of heritage. We no longer can wait for other people to come forward and teach others about respecting the past. We all have to teach the people around us to protect heritage properties. If it is not done now, then sadly we will soon lose our cultural heritage. We have to remember - 'a nation without an idea of history is like a person without a memory…'

The present issue has highlighted a number of significant aspects on heritage. The history and archaeology section includes papers and reports on lesser known structures and archaeological sites in India. Other section on conservation of cultural heritage includes researches carried out on restoring and conserving tangible heritage properties. The photo-feature in the edition highlights the condition of sculptures around a living Siva temple which is located in Sirpur, Chhattisgarh.

Feel free to share this e-journal with others. Share your thoughts, comments and ideas on heritage with us. Together we will form a better tomorrow for our country - India.

Enjoy reading!

Arvind K Dubey



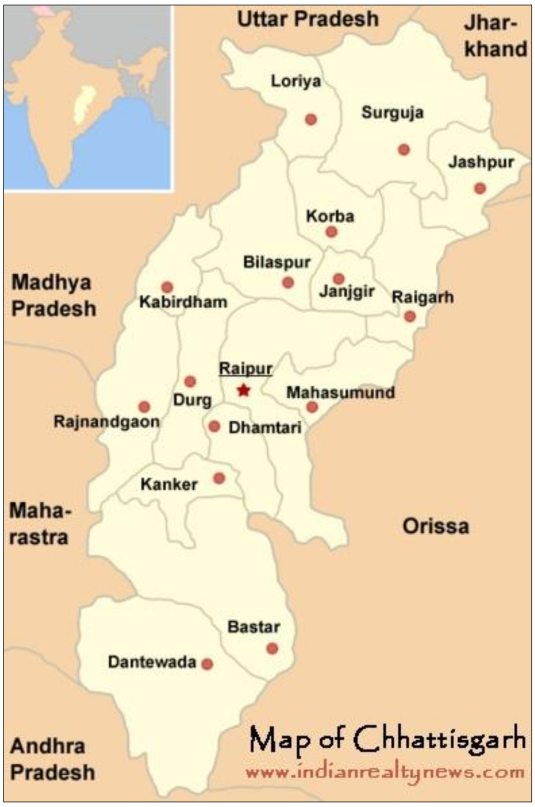
History and Archaeology



An Architectural Gem: Lakshman Temple, Sirpur

** Pinkipriya Verma*

Drained by the pristine waters of the Mahanadi and facing the Barnawapara Wildlife Santuary on the north-east, Sirpur or Sripura, as it was known in ancient days, is an idyllic village in district Mahasamund of Chhattisgarh. Sirpur lies approximately 83 km north-east of the capital, Raipur.



1. Map of Chhattisgarh
(source: www.indianrealtynews.com)

Sirpur, in the early centuries of the Christian era, was known as Sripura, literally meaning 'City of wealth'. According to *Epigraphia Indica* (Konow 1981: 184-201), Sirpur was 'once the capital of Maha-Kosala and was then known as *Sripura*'. Mahakosala here refers to the central districts of modern day Chhattisgarh, comprising Durg, Raipur, Mahasamund and Bilaspur (fig. 1). Mahakosala is synonymous with Dakshin Kosala. How Dakshin Kosala got its name is another interesting read. Legend has it that Ram, the king of Ayodhya in Kosala

(identified with present day Ayodhya, Uttar Pradesh), during his 14-year exile, spent a considerable portion of his time here (Mitra 2007: 5-10). Hence, the term Dakshin Kosala emerged in order to distinguish it from Uttar Kosala, Ram's kingdom.

Most of the historians claims that the history of Sirpur can be accurately traced from 5th century CE onwards. The Guptas here remained in power till mid 5th century CE. In Sirpur, the Guptas were followed by the Rajarsitulyas, the Sarabhapuriyas and the Somavanshis (or the Panduvanshis). It was under the Somavanshi king, Harsha Gupta (594 CE) that Sirpur achieved the height of its glory. By getting married to Vasata, the princess of Magadha, Harsha Gupta was able to forget alliances with one of the most powerful kingdoms of ancient India. However, his reign did not last long. After his death, Vasata built a Vishnu temple (now popularly referred as the Lakshman temple) in his honour.

Nomenclature of Lakshman Temple

Lakshman temple in Sirpur, dating back to the 7th century CE, is considered unique example of brick architecture in India. At the very first glance, one cannot help but wonder how a brick structure of this size has survived for centuries. Percy Brown mentions in his book that, at the base the temple measured 670.56 cm (22 feet) wide, and when complete it would have probably at least 1828.80 cm high (60 feet) (Brown 1956: 42). It is the only brick temple of its size still standing in this state of preservation.

A large stone inscription (c. 625-650 CE) recovered from the fallen debris of the *mandapa* in Lakshman temple, records the construction of a Vishnu shrine during this reign of the Somavanshi king, Mahasivagupta Balarjuna (c. 595-655 CE) by his widowed mother Vasata, who was the daughter of king Suryavarman of Magdha. There is no doubt that the inscription, written in *kavya* (poetic) style, refers to the present temple (Sharma 2007: 1-2). Queen Vasata built the temple in the memory of her husband, Harsha Gupta, who was an ardent devotee of Vishnu. Chronologically, we can see that the Lakshman temple falls in the post-Gupta period. 'Austere pot and foliage capitals and *kapota* (overhanging) cornice, all in carved brick, the rubbed down finish crisp and smooth, are in a highly individual idiom of the post-Gupta language' (Harle 1986: 140).

Though originally dedicated to Vishnu, as indicated by the epigraphic records, the

temple later came to be known as the Lakshman temple. It is unclear as to how the temple got its present name. A popular theory holds that, prominent among the various sculptural finds in the temple was an image of Sheshnag (five-hooded snake i.e. Vishnu's *vahana*) also referred to as Baikunth Narayana or an avatar of Vishnu. A plausible reason is that since Lakshman (Rama's brother in *Ramayana*) is also seen by some as an *avatar* of Vishnu or Krishna, and thus is indirectly identified with Sheshnag, the temple came to be named after him.

Another assumption is that, in old days, there was a tradition to name closeby temple structures in pairs. Hence, the presence of a Rama temple in the vicinity in all probability, gave this temple the name Lakshman temple. This temple at Sirpur is one of the most finest examples of the Mahakosala style. An architectural gem says Percy Brown, it is however not a living temple anymore.

Brick Architecture



2. Lakshman Temple, Sirpur: A brick structure

Brick architecture in India flourished principally in the great alluvial plains where good clay was easily available. Being composed of small units, the bricks offered greater constructional possibilities than stone. However, this also made it difficult to bridge large spaces, such as doorways and windows, thus introducing the use of beams of wood for these parts. Percy Brown mentions, that the wood came to be substituted with lintels of stone, and a phase then ensued when brick buildings with stone stressing found favour. The use of stone in the otherwise brick structure can be seen in the Lakshman temple as well, where the pillars of the *mandapa* now in ruins, the door-frame of the sanctum and the base platform are made of stone (Kramrisch 1986: 102). Lakshman temple is one of the loveliest brick temples in the country (fig. 2). Its construction was the turning point in the brick temple architecture according to Percy Brown.

Percy Brown identifies the temples at Sirpur and Kharod as one of the main groups of Brahmanical brick temples in India. He claims that the Lakshman temple is one of the first of its time to have a *sikhara*. The *sikhara* was not seen in temple built before the 7th century CE and its construction was a turning point in temple architecture, reiterates K.K. Muhhamed, Former Director (Monuments), Archaeological Survey of India (Mitra 2009: 19-30).

Art and Architecture of Lakshman Temple

The brick built Lakshman temple is the best preserved and stands on a 213.36 cm (7 feet) high stone platform. The temple is approached by two lateral flights of steps on the east. Originally, it comprised a *pancharatha* sanctum having five projections dividing its outer walls roofed by a slightly curvilinear *sikhara*, an *antarala* (vestibule chamber in front of shrine), and a *mandapa* (assembly hall), which stood on eight stone pillars arranged in two rows (Deva 1995: 38). The *antarala* and *mandapa* are now completely lost. In fact, the existence of *mandapa* can only be assessed by the remains of stone pillars.

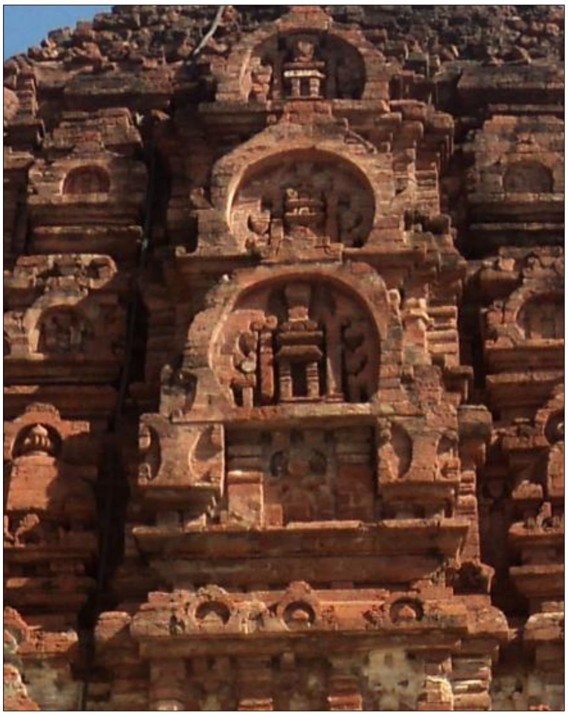
The Lakshman temple thus combines the *mandapa* plan of traditional temples with columns that were standard attributes of a *chaitya* hall. This was not seen in Gupta temples of 3rd-6th century CE, and is the first case of an elaborated porch or *mandapa* with interior columns. The necessity of constructing the main temple on such a high or elaborated platform was not just for making a visual impact. It arose due to its close proximity to River Mahanadi that flows barely 200 m away. The river is notorious for flooding its bank every year. The architects must have considered this and built a high platform to save the temple from the flood waters.

According to Percy Brown, Lakshman temple is the handicraft work of craftsmen in bricks, as the overall ornamentation is chieselled out of the brick work after erecting walls (Brown 1956: 42; Tomory 1982: 90). The temple comprises of a *pancharatha* sanctum, *antarala* and pillared *mandapa* (fig. 3). Lakshman temple podium has bold mouldings compose of *khura-kumbha*, *kalasa* adorned with *ashoka* leaves,



3. Lakshman Temple, Sirpur:
Remains of pillared *mandapa* with *antarala*

antarapatta displaying a short *vedika* with *kapotapali* embellished with prominent *chandrasalas*. The *jangha*, rising from a *manchika*, is dominated, like the Rajivalochana temple, by *Ruchaka* pilasters of the northern as well as the *vakataka* varieties and displays a feigned doorway on the *bhadra* (Deva 1995: 38-39), a pilaster framed niche crowned by a *kapota* and a prominent *gavaksha* - dormer in each *pratiratha*, and two pairs of pilasters on the *karnas* (fig. 4).



4. Lakshman Temple, Sirpur: *Gavaksha* - dormer window

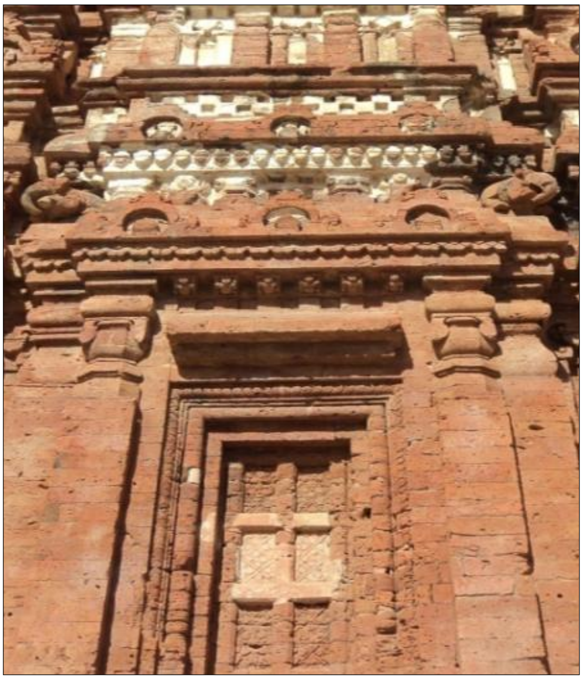
The *jangha* of the temple portion from the bottom of the *sikhara* to the top of the platform is elaborated decorated with motifs and patterns that cannot fail to catch the eye. The base is carved with *chaitya* arch motifs (fig. 5) and vase shaped mouldings. Intricately carved motifs of flowers and leaves and various animals motifs, particularly elephants also adorn the temple. There are three false windows, known as *mithya dwar/kuta dwar*, at the back and side walls (north, west and south side), of the temple. According to a popular belief this temple has four doors, first door represent *yoga* (practice), second *karma* (action),



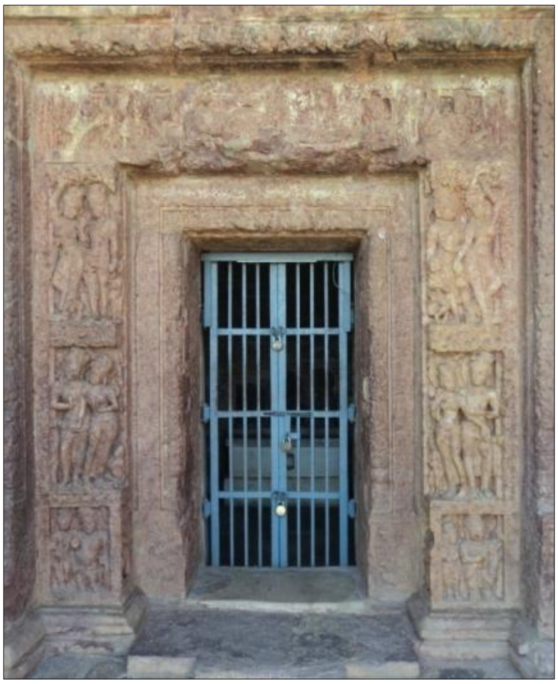
5. Lakshman Temple, Sirpur: *Chaitya* motifs

third *gyan* (knowledge) and fourth *bhakti* (devotion). *Bhakti* door open to all on the eastern side and remaining three doors are not opened. The three *mithya dwars* (fig. 6) of the Lakshman temple are enriched with minute details of floral and geometric patterns, all in the difficult medium of brick.

According to author's personal observation, there are four different storeys sculpted in a far more elaborate manner than in other surviving 7th century *sikharas*. The horse-shoe *chaitya* windows were adopted from Buddhist architecture embellish the *sikhara*. However, as opposed to their functional usage in Buddhist structure, here they are merely for decorative purpose. Archaeologist ascertained that when the Lakshman temple was discovered, the top of the *sikhara* had already collapsed. Thereafter, an attempt was made to reconstruct it, taking elements from the lower portion for assemblance. This however came under a lot of debate and criticism. The new construction was thus pulled down and the top portion was merely covered with plain bricks to protect the structure. The present roof thus, a restoration, does not matches with the original shape.



6. Lakshman Temple, Sirpur: *Mithya dwar/kuta dwar*



7. Lakshman Temple, Sirpur: Doorway of sanctum

The top of the *sikhara* of Lakshman temple, originally was probably flat and adored with an *amalaka*, several others hold that the *sikhara* would have been conical and risen at least 3 to 4.5 m higher. The most outstanding feature of the temple, however is the massive door-frame in stone, which adorns the entrance to the sanctum. The doorway to the inner sanctum of buff sandstone, is a superb example of post-Gupta exuberance, combined with invigorating and changes of scale (fig. 7).

Archaeologist M.G. Dikshit's book, *Sirpur and Rajim Temples* (1960) mentions that the mouldings forming the jambs and the lintel of the doorway are decorated with rich scroll work. The inner side of the door-frames contain a delicately carved large-sized lotus on each side, and the centre of the lintel bears a large *amalaka* flanked with winged horses and decorative scrolls.

The doorway has three bands of mouldings on the top as well as at the sides, lavishly embellished with figures and decorative ornaments. A figure of Seshasayi Vishnu (or Vishnu reclining on Sheshnag) flanked by Saraswati and musicians, is carved on the lintel and the band above it depicts scenes from Krishna leela (Deva 1995: 40)

The outer vertical band on both sides of the doorjamb is carved with *dasavtara* or the ten incarnations of Vishnu, specifically Matsya (fish), Koorma (tortoise), Varaha (boar), Narsimha (the man lion), Vamana (the dwarf), Parasurama (the sage), Rama and Krishna. The tenth incarnation which is yet to appear is Kalki.

There is middle band of moulding perhaps the most ornated. It has sculpted panels with the *salabhanjikas* (tree nymphs) on the top, *mithunas* (erotic sculpture) in the centre and the *ganas* (dwarf) at the lowermost panel. The human figurines are depicted in graceful pose (fig. 8) and they have elongated faces, lovely limbs which enhance beauty of door-frame. The entire doorway is designated to propel the viewer inward to the shrine. The third innermost band is intricately carved with foliage all through and a rectangle block with a bird motif (perhaps a peacock) at the base, on both sides of the door jamb. In the two corners above the doorway, two *makar* (crocodile) heads are seen protruding out from the wall.



8. Lakshman Temple, Sirpur: A couple on the door-frame

Lastly, the ornamentation was chiselled out of the brick work after the walls were built, and the carvings carried over the joints as if the whole work is made in one piece. The average size of the bricks is 42.6x22.5x7.5 cm and the surfaces of each have been laboriously rubbed down to a smooth finish, thus enabling

the joints to be kept particularly fine (Brown 1956: 42; Tomory 1982: 90). Their appearance therefore is that of a solid mass without the patchy effect, a characteristic of brick work (fig. 9).



9. Lakshman Temple, Sirpur:
Carvings of *ashoka* leaves in brick work

Archaeological Excavation in Sirpur

Sirpur during the reign of Mahasivagupta Balarjuna, would have expected to decline rapidly after his death. Under succeeding dynasties, Sirpur was relegated to the background and new cities were built such as Ratanpur and Raipur. In 1880s, Alexander Cunningham, the first Director-General of the Archaeological Survey of India (ASI), studied this region in greater detail. However, the archaeological excavation had to slow down as India underwent its freedom struggle.

Sirpur was excavated after independence by Dr M.G. Dixit from 1953-1955 on behalf of Madhya Pradesh Government and University of Sagar. He discovered the famous Anand Prabhu Kuti Vihara and Swastik Vihara and also Siva temple and Jain Viharas, later from 2000 CE. Other side of the site was excavated on behalf of Bodhisattva Nagarjuna Smarak Sansthan with Anusandhan Kendra. Dr A.K. Sharma excavated nine sites which yield Siva temples, Buddha viharas with most exquisite sculpture and tall sitting monolithic Buddha images and huge palaces complex of 6th century CE right on bank of Mahanadi. In 2004-05, excavation was carried out by Dr A.K. Sharma on behalf of Department of Culture, Government of Chhattisgarh (Sharma 2007: 28-30). Some of the monuments in the complex - Lakshman temple, Ram temple, Tivaradeva Mahavihara and Baleshwar temple are now protected monuments of ASI.

Site Museums

Apart from the Priest's residence, Lakshman temple complex comprises two site museums, established by the ASI. However, the museums are still not counted among the 44 listed site museums of ASI. Situated to the west and southwest of the temple, these museums housed some of the rare archaeological finds collected in Sirpur. There is collection of Hindu, Buddhist as well as Jaina sculptures such as Mahisasurmardini, Narsimha, Parvati, etc. The museum to the south, older of the two, has a *mukha-linga* installed in the center which catches one's attention. The other sculptures are placed all along the walls, both on pedestals as well as on the ground.

The other museum which is comparatively smaller, was constructed later to accommodate the new findings of excavations around the temple. The need to add another museum points to the great sculptural wealth of the region. Earlier, the older museum was in a form of shelter for the protection of the sculptures. In all some 200 Buddhist, Saivite, Vaisnavite sculptures were either recovered from the surrounding jungles or collected in the vicinity of the Lakshman temple.

The conditions of the collected objects is fair but not as per the norms for a museum collection. Some of the sculptures are simply dumped in the store house and the display technique of the collected objects is also not done in a proper way. The sculptures are permanently fixed in the pedestals (fig. 10). Local people come to the museum and worship the sculptures and figures (fig. 11). The ritual practices



10. Site Museum, Sirpur:
Sculptures fixed in pedestals



11. Site Museum, Sirpur:
Siva-linga worshipped by the local people

like application of vermillion and rice on sculptures is damaging them. Even the museums have not ideal micro-environment for the collected antiquities.

Percy Brown says that in all its aspects the Lakshman temple definitely proves that it was the handiwork of craftsmen who had served a long apprenticeship to this method of building. The Lakshman temple at Sirpur is one of the most finest examples of the Mahakosala style. An architectural gem, it is however not a living temple anymore, unlike a few other temples in Sirpur. At present the temple is a centrally protected monument under the jurisdiction of Raipur Circle of ASI, Chhattisgarh.

Conclusion

Sirpur, that till date was gathering dust in the pages of the ASI reports, has now become the cynosure of all eyes. The area is slowly gaining some limelight and it will soon become a major tourist hub. It will undoubtedly provide an alternative form of livelihood to the residents of this remote village and give a much-needed boost to their economy, bringing them on the world stage.

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Development of Surya Images in Sculptural Art of Bhubaneswar

* *Rusav Kumar Sahu*

The present paper throws a light on the stylistic development of Surya in the temple art of Bhubaneswar based on the field work having a background for the Sun worship in Indian and Odishan (Orissan) perspectives. Along with Buddhism, Jainism, Saivism, Vaisnavism and Saktism, Saura or Surya cult flourished throughout the length and breadth of the state of Odisha (Orissa) in general and Bhubaneswar in particular. The Sun worship was practiced since ancient times as evident from the series of punch-marked coins discovered in and around Bhubaneswar at the sites like Jharpara, Dhauli, Sisupalgarh and Khandagiri. These coins display the symbolic representations of the Sun god i.e. a circle with radiant rays from all sides. However, the earliest figurative representation of Surya in Bhubaneswar is carved on the tympanum of Anantagumpha in Khandagiri hill (fig. 12). Thereafter, the temples of Bhubaneswar displayed the Sun god as an *avarana devata* on the exterior wall of the temple in different segments besides its presence in the *navagraha* slab.



12. Anantagumpha, Khandagiri Hill: Depiction of Surya, 1st century BCE

Depiction of Surya in Art: A General Overview

In India, Sun worship was originated as early as in the Neolithic period unlike the rest of the world (Srivastava 1972: 20-21). In Vedic period, the Sun god of the primitive age was transformed and sublimated. The depiction of an encircled sun on a Neolithic pottery from Piklihal (Allchin 1960: 26-77) is undoubtedly significant. The two stone slabs retrieved from the Neolithic site of Burzahom (Period-II) in Kashmir depicted the abstract form of sun. The excavator of Burzahom as well as the other scholars defines one to rising and other to setting sun of which the hunting is being performed in the day time (Agrawal 2002: 180).On the paintings in the rock shelters of Singhanpur (Raigar area, Chhattisgarh), the Sun god has been represented with seven rays (Srivastava 1972: 22).

The earliest anthropomorphic representations of Surya has come from Patna in Bihar on a terracotta circular disc in which the Sun god is shown mounted on a chariot drawn by four horses (Singh 1935: 125). The figure is ascribed to the Mauryan period. The terracotta figurines of Sun god from Chandraketugarh (Dasgupta 1959: 46); Surya depicted in a medallion of Bharhut (Nagar 1995: 151); Surya depicted in a railing of stupa of Bodhgaya; and the Sun image of the Bhaja cave in Maharashtra (Banerjea 1956: 432-33) are some of the finest workmanship of the Sunga and Satavahana artists dating back to 2nd century BCE. Later after the Gupta period, a large number of sculptures of sun have been sculpted throughout the country although very less in South India.

The artistic expression of Sun motif in Odisha is found in the prehistoric period as evident from the rock art panel of Gostimoda-I in district Sundergarh. Stylistically, this prehistoric rock art ascribed to Mesolithic period. The Chalcolithic pottery of Nuagada in the middle Mahanadi valley and Manamunda in district Baud also yielded the sun motifs (Bedbak 1999: 199). The Solar symbols like the rays and the lotus, etc. in the silver and copper punch-marked coins discovered from Sonepur, Baripada, Chhatrapur, Asurgarh, Salipur and few other places of Bhubaneswar (Das 1985: 253). After that the rock-cut monuments of Khandagiri and Udayagiri and the series of Hindu temples of Bhubaneswar depicts the figure of Surya starting from Laxmanesvara temple to the Kapilesvara group of temples covering a time span of 800 years.

Surya in Khandagiri and Udayagiri Hill

The figurative representation of Surya in Anantagumpha (Cave no. 3, Khandagiri) dating back to 1st century BCE is compared with the image of Bharhut and Bodhgaya in terms of artistic treatment (Mitra 1975: 54). Here the Sun god is depicted as a turbaned royal personage wearing heavy *kundalas* (earrings), a necklace and bangles. He is seated under an umbrella, with a female figure holding a flying-whisk on either side and driving a chariot drawn by four spirited horses. Above them are representation of moon surrounded by stars and the sun which symbolise the stellar world. The left hand of the figure is placed on the waist and the right hand on the chest. A demonic pot-bellied dwarf holding a spouted water pot in his left hand and a banner in his right hand stand at the right end of the relief near the right wheel of the chariot. Another image of Sun is carved in the middle of the back wall of Tattvagumpha cave, lower down the Khandagiri hill which is not clearly visible. The twin hill is a holy place of Jainism right from the 1st century BCE to the present day. It shows that Saura (Surya) cult was popular in the region from the early days.

Surya in Temple Art of Bhubaneswar

After the depiction of Sun from the Khandagiri hill, there is no such depiction in the early historic paintings of Sitabinji in district Keonjhar dated to 5th-6th century CE. But from the Sailodbhava period (6th-7th century CE to the 15th century CE), depiction of Sun is found on the walls of temples which include Laxmanesvara, Parasuramesvara, Svarnajalesvara, Simhanada, Muktesvara, Vaital, Varahi, Lingaraja, Jagannatha, Sobhanesvara and the Sun temple of Konarak. Covering a period of more than 800 years, the Sun god is found engraved independently and worshipped either in *garbhagriha* or niches in the temple walls, panels, *Surya-yantra* and *Navagraha* panels, etc. In Laxmanesvara temple which is considered as the earliest surviving temples in Bhubaneswar depicted the seated figure of Surya in the *gandi* of *kanika paga* right above the *bada*. The deity seated in *padmasana* and holds two full-blown lotuses on his either hands and wears a coat.

In Parasuramesvara temple, Surya images are found on the northern *bada* of *jagamohana* along with other gods like Virabhadra, Ganesa, a group of Saptamatrikas and Lakulisa. The Sun god holds two lotus flowers on his either hands in a standing pose. The absence of seven horses along with the charioteer, Aruna and Prabhabali at the back of the head is the typical feature of early Sun images found in the temple art

of Odisha but it is not found in the figure of Sun as the *jagamohana* was added in later period. Here the Sun god is depicted wearing boots and a coat of which is a typical Iranian feature. Above the eastern *raha* niche of the *vimana* of this temple there is a beautiful *Kalyanasundara* panel (fig. 13) having a standing figure of Surya holding lotus in his either hands. Here the Sun god has been considered as the minor deity. In the conjunction of *raha* and *kanika pagas* of the *vimana* particularly in the eastern side, four images has been carved in the exterior wall of which one is seated (fig. 14) and three are in standing posture which includes the *Kalyanasundara* panel. The rest of the four figurines of Sun are facing towards the east direction.



13. Parasuramesvara Temple:
Surya in *kalyanasundara* panel



14. Parasuramesvara Temple:
Depiction of Surya in *gandi*

In the southern part of *vimana*, Surya seated right above the *baranda* along with royal couple and Mahisasuramardini one above the other in the conjunction of *raha* and *kanika pagas*. In the *sukanasa* of the *vimana* which is slightly projecting towards the northern side, there is an impressive standing figure of Sun holding two fully-blown lotuses along with an attendant on its left. Surya stands on the left side of the figure of Nataraja within the *chaitya* design. This type of image has also been found in the Vaital temple where the Sun god is placed right below the figurine of Nataraja. However, Surya here in this temple placed within a small niche. The present survey of this temple yielded that Ganesa images out-numbered the Surya. In the Svarnajalesvara temple, the Sun god has also been depicted in the marriage scene of Siva and Parvati right above the northern *raha* niche same as depicted at Parasuramesvara temple. Another figure of the god is found in eastern part of the

gandi in between the conjunction of *raha* and *kanika*. Both the figures are stylistically similar with the former one. The other temples like Amuhna, subsidiary shrine of Brahmesvara precinct in Bhubaneswar and Simhanada temple at Baramba, etc. also displays sculptures of Surya.

In Odisha as well as in Bhubaneswar Sun images have been carved in the *vimana* (*deul*), *jagamohana*, *natamandapa* and even in the *Navagraha* slab. In *vimana*, he is found in *bada*, *gandi* and *mastaka* as seen in the Parasuramesvara, Svarnajalesvara, Muktesvara, Amuhna, Vaital temple and in the *parsvadevata* niche of the Varahi temple at Caurasi. Again, he is represented on the *bada* of the *jagamohana* of Sobhanesvara temple, Niali. Moreover there is no definite rule of depicting the images of the Sun god in a particular portion of a temple. Mostly the depiction of Sun god is found on the exterior walls of the temples.

Another sculpture of Surya of the late 6th century CE (Dehejia 1979: 85) is found in the damaged niche of the compound wall of Laxmanesvara temple of Bhubaneswar which is not available at present. Another broken sculpture of Sun god dated to 6th century CE is found in the compound of Lingaraja temple. The depiction of Sun as already described is also found in the northern side of *jagamohana* of Parasuramesvara temple which belongs to the 7th century CE (Panigrahi 1961: 54).

There is a beautiful image of Surya carved in the eastern *raha* of *Vajramastaka* (fig. 15) in Vaital temple of Bhubaneswar right below the Nataraja image. The deity is two armed, standing over a chariot drawn by seven horses along with Aruna. Surya here is shown only up to the knee portion which bears great resemblances with the sculpture of Surya found from Kashipur (West Bengal), now housed in Ashutosh Museum of Calcutta University, Kolkata. The deity holds two fully-blown lotuses, and adorns various ornaments in the neck, *kirita mukuta*, *kundalas* in the ear, etc. Figurine of Aruna is holding the string of the horses in the left hand and whips in the right. Usa and



15. Vaital Temple:
Depiction of Surya in *vajramastaka*

Pratyusa stands on either side of the deity at the base whereas two flying *gandharvas* at the top. The iconography of Sun god mentioned in the *Brihat Samhita* of Varahamihira and *Agni Purana* matches with this sculpture of Surya. Having the same iconographical features of Surya, another is now displayed in the Odisha State Museum ascribed to the 8th century CE.

At Muktesvara temple in the inner enclosure, two figures of Surya have been found carved. The former one sits cross-legged on a stylised chariot (looking more like a low table) with his seven mares before it. He holds two lotuses and wears a tall crown. His face is slightly damaged. The later one sits on a chariot in *padmasana*. The figure of Sun god here holds a large lotus in each hand and wears an elaborate hair style and crown.

An amazing and interesting image of four-armed Harasurya, holding a trident and a lotus is found in a mundi niche on the *jagamohana* of the Lingaraja temple. This sculpture of Sun god is similar in fashion as the one housed in Konarak Site Museum of Archaeological Survey of India (fig. 16). At Konarka temple itself, in the *natamandapa* depiction of Sun god with four horses along with Aruna has been carved on the right side of a balustrated window.



16. Konarak Site Museum:
Surya holding trident and lotuses

Navagrahas are frequently carved in the architrave of Odishan temple. In all the Pre-Somavamsis temples like Bharatesvara and Satrughnesvara group, Parasuramesvara, etc. only eight planets are seen with the exception of Ketu. All the planets except Surya and Rahu are shown holding rosary in the right hand and a water pot in the left. Surya holds two lotus flowers in his either hands and

Rahu is depicted as a half bust figure with hands in the *tarpana mudra*. The greatest number of presentation of *Navagraha* is found in the Lingaraja temple.

As far as the stylistic development of Surya in the temple art of Bhubaneswar in particular and the state of Odisha in general is concerned, there are altogether four categories of Sun images have been found which are,

(I) Surya standing without any chariot,
(II) seated images of Surya without a chariot,
(III) Surya riding on a chariot, and
(IV) Surya riding on his horse.

The images of the first two categories are found in most of the formative phase temples of Bhubaneswar. In the first category, the Sun god is represented in a simple standing pose devoid of any chariot or attendants. Mostly he holds the stalk of a fully-blossomed lotus in each hand and assumes a rigid frontal pose i.e. *samabhanga*. He is usually dressed in a heavy northern type garment, with heavy boots, truncated crown, etc. The images of this category are also found in Parasuramesvara and Svarnajalesvara temples of Bhubaneswar. The seated images are found in *padmasana* without any attendant figure and with conventional body ornaments like necklace, *yajnopavita*, girdle, armlets, crown, etc. The images from Laxmanesvara, Parasuramesvara, Svarnajalesvara and Sobhanesvara temples of Niali, etc. belong to this category. The presiding deity of Konarak temple might also belong to this category (Boner 1972).

The most popular and complex type of images depicts the Sun god riding a chariot found in the late formative, transitional and mature phase temples of Bhubaneswar as evident from the sculptures of Sun at Vaital, Varahi, Muktesvara and Lingaraja temples. The style of riding the chariot is varied from place to place. The first depiction of Surya is shown from his hips up with his legs disappearing into the chariot. In the second mode Surya is depicted in *padmasana* on his chariot and in the third mode he stands on his chariot in *samabhanga*. The last variety of Sun riding a horse is found in the *parsvadevata* niche of the Sun temple of Konarak. The stylistic development of Surya is not only confined to Bhubaneswar but also to the other parts of the state. Apart from this, the study of new theories and iconographic features of Sun found in the region will throw a fresh light.

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Munsar Tank of Viramgam

*** Hardika S. Pandya**

Water monuments or structures are the unique form of architecture associated with the water preservation and conservation. Construction of different types of water monuments is an important features of ancient town planning. Wells, step-wells, ponds, tanks, etc. were those water monuments which were part of town planning in ancient times and even continued in medieval period. The use of such monuments is still prevalent at some places.

Especially in Gujarat, a regular network of interesting and magnificent water monuments have been recorded (Jain 1981). One can find a large number of ancient structures in this region for the storage of water. Interestingly antiquity of some of the water structures dates back to Chalcolithic period. The tanks constructed around the fortified city of Dholavira are the best specimens. Majority of such architectural structures are found in north and central Gujarat as well as northern and southern Saurashtra (Pandya 2008).

The golden period of architecture in Gujarat came during the Solanki dynasty (9th-12th century CE) when some splendid monuments were made. The massive buildings in the form of tanks, step-wells, etc. continued to be constructed throughout the Solanki period. Some of the best examples of ancient tank architecture are

Sahatralinga tank and Khan Sarovar, Patan; Sudarshana talav, Girnar (Junagadh); Malav talav, Dholka; Sarmistha talav, Vadnagar and Munsar tank at Viramgam (Ahmadabad). The present paper however deals with the Munsar tank or talav of Viramgam.

Munsar Tank: An Introduction

Munsar or Mansarovar talav is located in district Ahmadabad to the west of present town of Viramgam (fig. 17). This tank is one of the marvelous monuments which got its shape during the Solanki period in 11th century CE. According to historical records it might have been built by the orders of Queen Minaldevi, mother of King Siddharaj Jaysimha the famous monarch of Solanki dynasty (*Gazetteer of Ahemadabad District*, 1984: 919). In early days this town was known as Dhoosadi but at present it is known as Viramgam due to two popular temples - Virameshwer and Suramesahwer, constructed on Munsar tank by the Vaghela king Viramdev, son of king Lavanaprasada of Vaghela dynasty (Raval: 98-99).



17. Munsar tank, Viramgam: Google Imagery
(Source: Google Earth)

This tank is a distinguished monument from architectural point of view as it consists of twin double-shrine temples namely Sas and Bahu temples (Dhaky 1961: 183). Several other small shrines are surrounding the tank. There are four ghats amongst which one is located on northern bank, one on eastern bank and rest of the two on southern bank. On the western bank there are five *parnalas* (water vestibules)

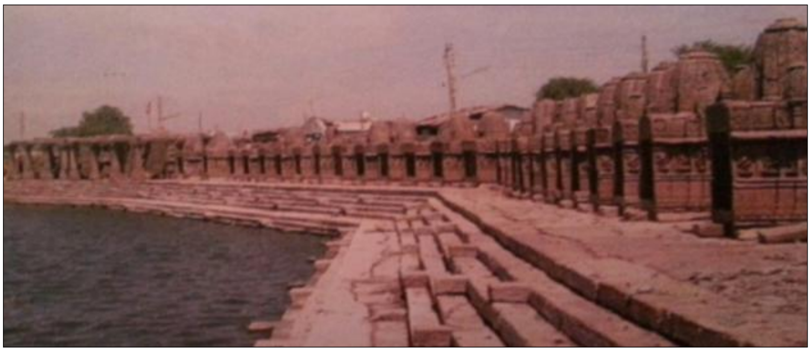
measuring 1.5 m in diameters below the projecting square platform (fig. 18). These *parnalas* are further connected to one big octagonal well called 'rudra kupa' through a small channel. Above the square platform, there is a *mandapa* like structure with pyramidal super-structure. Later it was converted into a temple, as there are traces of the small shrines at the back wall of this temple (fig. 19), locally known as 'Munsari mata nu mandir'. Horizontally, the tank structure is quite irregular in shape but it resembles the conch-shape or *shankhaakar* in Sanskrit. Amongst 520 small shrines surrounding the tank only 300 temples are now surviving (fig. 20). These small temples are having one structure with curvilinear *sikharas*, composed of an orderly grouping of miniature multiples of itself. Some of these temples are dedicated to god Shiva and Vishnu.



18. Munsar Tank, Viramgam: *Parnalas* on the western bank



19. Munsar Tank, Viramgam: Back view of Munsari Mata temple



20. Munsar Tank, Viramgam: Miniature shrines on the bank of the tank

Shiva Temples

On the eastern, western and southern banks, the miniature temples are dedicated to god Shiva (fig. 21), as it has remains of *yonipatta* in the sanctum, but none of these temples have shiva-linga (fig. 22). On the exterior of these shrines, there are beautiful sculptures carved out with attendants on either sides, but due to weathering many of these are now un-identified. All these temples are having same sculptural patterns which are identified as, Shiva on eastern wall, Chamunda on southern wall and 'Andhakasur vadh murti of Shiva' (Shiva killing of demon andhakasur) on western wall.



21. Munsar Tank, Viramgam: Miniature shrine of Shiva

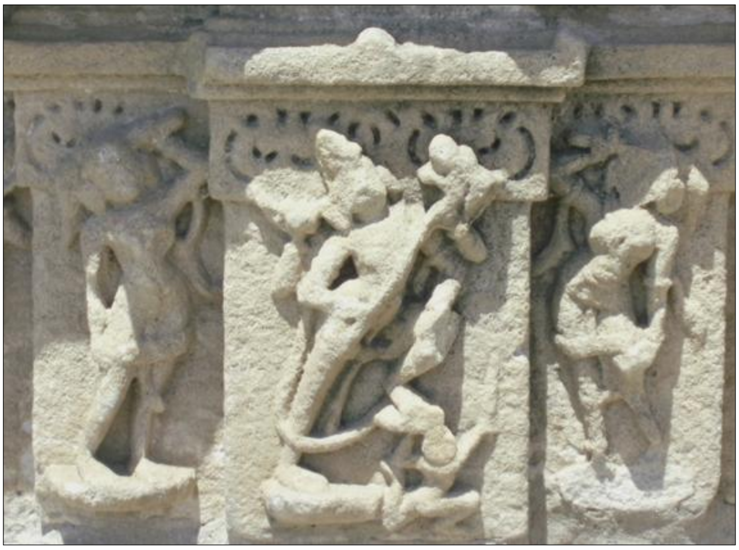


22. Munsar Tank, Viramgam: *Yonipatta* in the miniature shrine of Shiva

Vishnu Temples

On the northern bank, the miniature temples are dedicated to god Vishnu as there is a surviving raised platform inside the sanctum on which god's image is placed. Unfortunately not a single original sculpture is surviving in any of these temples. The images on the exterior of shrines are same as Shiva shrines, but the only difference is that there is an image of god Vishnu along with the attendants on both the side walls

and 'Andhakasur vadh murti of Shiva' on the back wall (fig. 23). On the northern bank, there are two structures on the left of the ghat. These structures look like sanctums with beautifully carved door-frames, but none of the images on the lentil are clear enough to be identified. It could possibly be a Vishnu shrine as all miniature temples of same side belongs to god Vishnu.



23. Munsar Tank, Viramgam: Andhakasur vadh murti of Shiva

According to a legend, there were bells in all these miniature shrines tied together with a single long string, which when pulled makes all these bells ring together at the time of worship in morning and evening. However, now there are only traces of loops in some of these temples to tie the bell in them.

The Twin Double-Shrine Temples

There are twin double-shrine temples on the southern bank of the tank. They are constructed on the either sides of the ghat (fig. 24). According to Danasharna (a copper-plate inscription) of king Bhuvandeva II, his son Lavana prasada constructed these temples in the name of his son Virameshwar and queen Sumaladevi (Shastri 1983: 23). Thus these temples were named as Virameshwar and Surameshwar temples. At present these temples are known as Sas-Bahu temples.

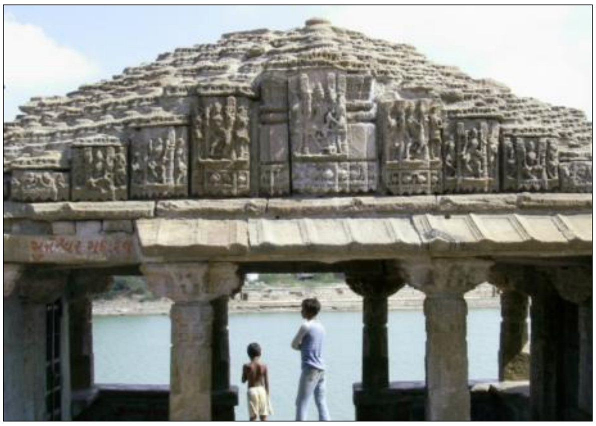


24. Munsar Tank, Viramgam: Twin double-shrine of Sas-bahu temples

Architecturally both the temples are same, only difference is in their size. Sas temple is comparatively bigger in size. The ground plan of both the temples follows the *astha-sala* pattern of Chalukyan style and consists to sanctums on either sides of square shaped *mandapa* which is further connected to stairs leading down to the bank. The *mandapa* consists of eight pillars and four pilasters and are of *misrak* style. The ceiling of the *mandapa* is beautifully decorated with full blossom lotus pattern (*sahatrakamala*) (fig. 25) and roof is designs in inverted bell shaped motifs together forming a pyramidal structure (fig. 26). Both the sanctum (*garbhagriha*) has a fully carved door-frame (*dwarshakha*) of *panchdwarskha* pattern. The figures at the base of the door-frame are badly weathered and it is difficult to identify them. The sculptures however looks like female figures so probably they could be water goddesses Ganga and Yamuna. The lentils (*lalat-bimba*) of both the sanctum have sculptures of Ganesha but on the left sanctum there are nine weathered sculptures, probably could be of Navgraha. All the sanctums have *yonipatta* but Shiva-lingas are missing, except in left sanctum of Sas temple. Though renovated it still have original Shiva-linga and a sculpture of Parvati in niche. People still worship in the temple and call it as “Mansaraya Mahadev”.



25. Munsar Tank, Viramgam: Ceiling of *mandapa* showing *Sahatrakamala* design



26. Munsar Tank, Viramgam: Roof of *mandapa* showing inverted bell shaped motifs

At the *vedika* level in the niches there are sculptures of Gajasurvadh murti of Shiva, Bhairava and Chamunda along with the attendants on either side. There are sculptures of dikpala at the corners along with a nicely carved sculpture of Ganesha and its attendants (fig. 27). There are sculptures of Shiva on all the three sides in the niches, at the base of *sikhara* on the *sukanas* level.



27. Munsar Tank, Viramgam: Ganesha with attendants

Discussion

The Munsar tank follows the tradition of the ancient architectural texts, *Aprajitpruccha* and Vishwakarma's *Vastusastra*. This is testified by its location on western side of old fortified city, presence of wells, *parnalas*, stone retaining wall, ghats and the flights of stone steps arranged as describe in *Vastusastra*. According to the *Shilpasastra*, sculptures of Vishnu in the form of Shesayin or Jajasayin seems to be necessarily belonging to water monuments as he is identified as lord of water. The presence of the sculptures of Vishnu in miniature shrines on the bank justifies with the ancient architectural texts. The presence of both Shiva and Vishnu in this structure shows the worships of both the deities' together. The amalgamation of two different religious beliefs and cults shows the liberality of the patrons of this monument, towards different religions. This structure is slightly distinguished from architectural point of view as it has twin double-shrine temples which are unique in Gujarat. The numerous miniature shrines on the bank of Munsar tank justifies that how Sahatralinga tank at Patan had accommodated 1008 shrines on its bank.

This monument was subsequently conserved by the Archaeological Survey of India (Burgess 1971: 91), but at present it is in bad condition. The ghats and tank is being used for daily purpose by the town people, due to which it is getting damaged. The temples are now known as 'Mansurya mahadev' and people still goes there to worship which is again leading to destruction of beautiful carvings and sculptures along with other architectural motifs. If some proper action is not taken in near future by the concern department to protect such a heritage site of Gujarat, the next generation will never get to know about our a glorious past. This and many more such heritage sites of Gujarat are worth visiting at least once.

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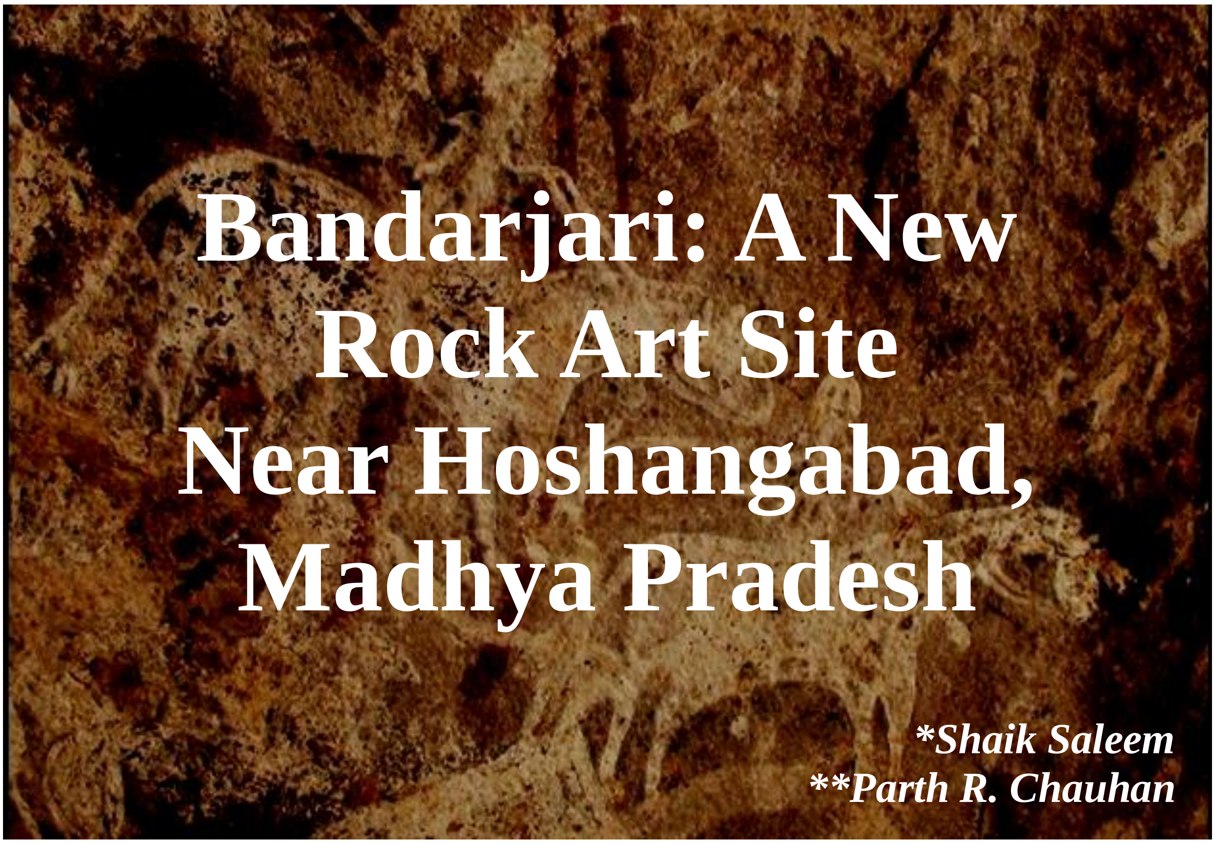
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Bandarjari: A New Rock Art Site Near Hoshangabad, Madhya Pradesh

*Shaik Saleem
**Parth R. Chauhan

In South Asia, prehistoric paintings were discovered as early as 1867, but knowledge about their precise antiquity and cultural connections with surrounding regions is not yet known (Mathpal 1992: 207-214). Since then, due to the efforts of the scholars such as Wakankar, Mathpal, Bednarik, Kumar, Tiwari, Gordon, Pandey and Tyagi, useful information on various aspects of Indian rock art was brought to light and published (Saleem 2008).

On the basis of the style, superimpositions, patina, themes, colours, subject matters, and archaeological materials associated with the rock paintings, one can suggest a provisional and relative chronological sequence for Indian rock art until the paintings and other art forms can be dated in-directly. In the study of prehistoric rock art, it is essential to observe the stylistic features, superimpositions and colour of the paintings. The earliest paintings are often in a highly fragmented state and are covered with thick patina, in such conditions it is very difficult to study the subject matter in the rock paintings. Some of the rock paintings were dated to the later Paleolithic period and a few have been assigned to the Historical period. According to Bednarik et al. (2005: 147-197) efforts have been made to directly date rock art, but estimating the precise ages of individual paintings remain as one of the most challenging tasks in South Asian archaeology. In India, most prehistoric paintings

occur on rock faces or walls of rock shelters and unlike many well-known European sites, paintings are rarely found deep within caves. The earliest rock paintings (presumed from their position under the other paintings) are in a highly fragmented or poorly-preserved state and are covered with thick patina, and in such conditions it is very difficult to make out the precise subject matter of the paintings.

Rock paintings of the Mesolithic period found in India reflect greater uniformity in style and show a remarkable difference between the depiction of human and animal forms. Animals were depicted naturalistically, while humans were depicted as stick-like figures in a stylistic form. The latter were sometimes shown wearing masks or elaborate head dresses. Paintings of human females and those of animals were depicted as being quite bulky with body decorations of intricate designs such as spiral or honey-comb patterns, suggesting broad continuity of an earlier tradition (Tyagi 1992: 303-317). Variability in the style of the rock paintings both chronologically and regionally is an important feature in Indian rock art. In the absence of absolute dating of rock paintings, one can establish a relative chronological sequence for Indian rock paintings based on the afore-mentioned criteria. This has helped to provisionally assign and organise the various rock paintings to the Upper Paleolithic, Mesolithic, Neolithic/Chalcolithic and Historical periods. Some Indian sites have yielded archaeological evidence belonging to all of these periods, one reason being the lengthy duration and adaptation of microlithic technologies well up to the last two centuries. Similarly, excavations and surveys conducted in the rock shelters of central India have yielded similar material and have helped to establish a broad chronological sequence.

In 1957, V.S. Wakankar discovered hundreds of painted rock shelters around Bhimbetka in central India and started a broad survey of painted rock shelters in the country (Wakankar 1975: 17-34). Later, Wakankar and V.N. Misra respectively carried out excavations in some of the rock shelters at Bhimbetka and revealed stratified cultural sequences from the Lower Palaeolithic to Historical periods (e.g. Misra 1985: 35-47). Another well-known rock art site in the region is Adamgarh near the town of Hoshangabad and closer to the Narmada River and which was well-known even before the discovery of Bhimbetka. In addition to the rock art, preliminary excavations in the rock shelter and surrounding areas at Adamgarh yielded both Acheulean and microlithic artifacts in different sedimentary facies (Joshi 1978). Additional rock shelters in this central region, with paintings of various periods as well as evidence of stone tools, can be found at Raisen, Kharwai,

Shyamala Hills, Bhopal, Shahad Karar and Pachmarhi. The site of Bandarjari presented in this article represents one of the latest rock art sites to be found in this archaeologically-rich central Indian zone.

Bandarjari

The site of Bandarjari was 'discovered accidentally' when local youths showed the rock paintings to the authors during a paleontological survey in the Narmada Basin in 2009. It is not clear from previous publications whether this site has been discovered and reported earlier by other scholars.

The Bandajari rock shelter is located about 10 km north of the Narmada River (fig. 28), about 14 km south of the Bhimbetka rock shelters and appears to contain minimal occupational debris. The site is situated in a deciduous forest within the Vindhyan hills where the vegetation is moderate and dry scrub and there is a



28. Location of Bandarjari between Adamgarh and Bhimbetka
(Source: Google Earth)

seasonal *nala* nearby. The entire face of the hill of which the rock shelter is a part, is gradually weathering. Although most rock shelters frequently yield associated archaeological evidence, further investigations such as survey and test-pits are necessary to confirm evidence of stone tools at Bandarjari. Perhaps the function of this site was only for producing rock art and not stone tools or habitation as at other larger rock shelters in the region such as Bhimbetka and Adamgarh. One reason for the presence of paintings in this otherwise remote location may be that the site may

have been along a transit or trade route during proto-historic and/or historic times. It preserves painted evidence in the form of typical red (Mesolithic) and white (Chalcolithic and Historical) depictions of deer, other animals, humans and also riders on horseback (fig. 29-35). This reflects the continued importance of this site/ location for many millennia, despite the rock shelter's position deep in a thickly forested and hilly zone.



(29-35) Bandarjari Rock shelter, near Hoshangabad, Madhya Pradesh:
29. Cattle in association with human figures (note overlapping of many figures); 30. Deer with antlers in red, late Mesolithic period; 31. Riders on horseback; 32. Female figure in white, Historical period; 33. Historical human figures - battle scene; 34. Red 'deer' is in flat wash and appears to be transitional from Mesolithic to Neolithic in style, human figures in white have a dark outline (note wasp nest on right); 35. Human figure in red outline

Note: pictures have been cropped for better view

The rock shelter preserves over twenty-five individual paintings. Although more may have been originally present, they may not have been preserved due to natural weathering and other factors. This is evident from some of the paintings which are not clearly visible and very faint. Most of the painted figures appear to be of the Chalcolithic and/or Historical periods. The occurrence of red paintings in typical Mesolithic style is comparatively less. Some of the red (Mesolithic) paintings have been re-painted in white during the Chalcolithic-Historical period(s) and some white paintings are superimposed on the (presumably older) red ones. Further systematic surveys in the region may yield additional rock art sites and possibly in association with habitation deposits that can be dated (fig. 36). For example, scientists have successfully dated sediments from a wasp's nests (see fig. 34) at other rock shelters to provide a minimum age of the associated art.



36. Bandarjari: Rubble at the base of the rock shelter

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A Recent Investigation on Architectural and Sculptural Art of Someshwar Mahadev Temple

* Nirmala Shukla

Someshwar Mahadev ($25^{0}12'$ N.,$81^{0}03'$ E.), a beautiful temple, is located in Village Char which is about 15 km away from Karvi tehsil of district Chitrakut, Uttar Pradesh. Chitrakut is one of the famous towns in district Satna of Madhya Pradesh. It is a town of religious, cultural, historical and archaeological importance, situated in the Bundelkhand region (Varun 1988: 283).

Historical Background

Traditionally, Chitrakut is associated with Lord Ram, his spouse Sita and his brother Lakshman who had spent here eleven years and a half of their exile. During the period of Mahabharata, the area came into prominence. According to the earliest known traditions, Chedis were ruling over this area. The Chedi kingdom was considered one of the principal Janapadas of those times and lay within the Madhyadesha. Chedis were overthrown by Vasu, a descendent of Kuru who conquered the Chedi country and used epithet ‘Chaidyoparichara’ (*Dainik Jagran* 2011: 3). In 4th century BCE, the area might have been included in the territory of Nandas of Magadha and after the decline of Nandas it fell into the hands of Mauryas.

The region of Chitrakut also remained under the control of Nagas for a short while who were ruling from various capitals in North India. This part of Bundelkhand once

fell in the territory of Nagas of Padmawat and Bhavanaga, Ganapatinaga and Nagasena who were some of the famous Naga rulers (*Amar Ujala* 2011: 6). Guptas conquered Bundelkhand from Nagas and ruled till the end of 5th century CE as witnessed from their inscriptions and temple edifices found in this region (Varun 1988: 285).

Salient Features of Someshwara Mahadeva Temple

Someshwara Mahadeva temple comprises a large *nagara* style temple facing east. This dilapidated temple locally known as Someshwar temple is dedicated to Siva. It was probably dates back to 11th-12th century CE of Chandela period. The temple is made of red and buff sandstone. It stands on a low plinth and consist sanctum, vestibule, *mandapa* and a small pillared *mukha-mandapa*. The sanctum is *triratha* on plan having plain but bold pitha mouldings comprising *bhitta*, *khura*, *kumbha*, *kalasa* and *kapotapalli* followed by *jangha* and curvilinear *sikhara* in elevation. The *jangha* has double band of friezes having bold *hiraka* motif which is crowned by a *chaitya* pediment. The cardinal *rathikas* are having projected pillared balconies in two tiers. The *jangha* is divided by a set of mouldings.

The square sanctum is entered through a *tri-sakhas* doorway consisting of foliage motifs. The entrance is flanked by mutilated figures of goddesses Ganga on the right and Yamuna on the left at the bottom of door-jamb. The Saiva *dwarapalas* are seen standing on the right and left of door-jamb on either side of river goddesses. The door-lintel is carved with foliage designs having seated figures of Brahma and Vishnu on the right and left respectively while Siva is depicted in the centre of *lalatbimba*. The door is carved with a band of *hiraka* motif with Vinadhari Siva on the right, Lakshmi on the left and Ganesa in the centre.

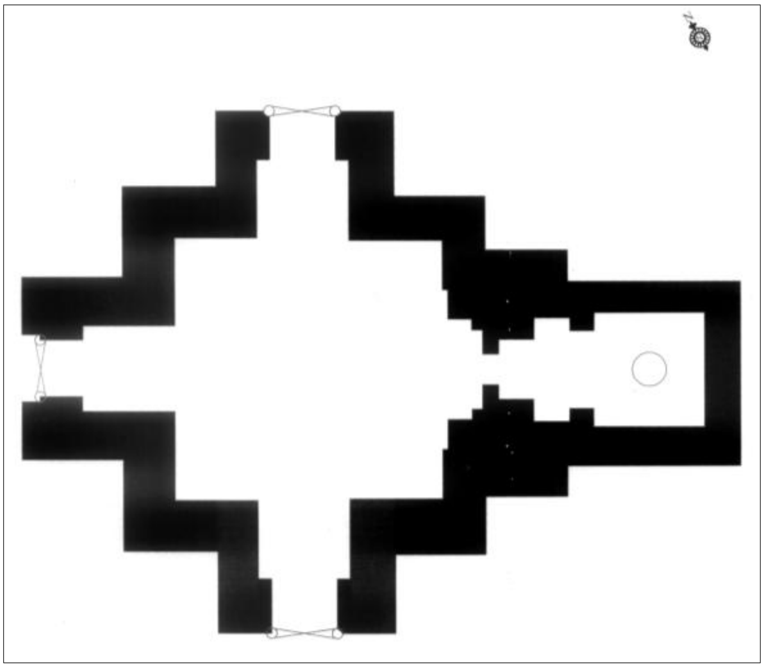
The square sanctum inside approached through two steps from the floor level of *mandapa*. The sanctum enshrined a Siva-linga. The linga has one square and one round pitha which are placed one above other bearing a natural pebble as linga which is a latter addition. The sanctum has plain interior walls.

The sanctum is followed by a narrow plain vestibule and a *mandapa*. The *mandapa* which is square in plan must have a massive roof but it is missing now. The side entrances of the *mandapa* are flanked by pillared niches enshrined with

the sculptures of gods and goddesses. The southern entrance of the *mandapa* enshrined the sculptures of seated Saraswati on the right and Ganesa on the left while niches on the northern entrance are lying vacant (*Somnath Mandir, Atit ki Yatra ka Sunder Rochk Prasang*). The exterior walls of the *mandapa* are profusely decorated with horizontal double band of *hiraka* motif along with vertical bands of foliage designs. The temple had a curvilinear *sikhara* (now missing) as suggested by the architectural members and large number of *amalaka* stones of varied sizes scattered around the main shrine (fig. 37-38).



37. Someshwar Mahadev Temple, Chitrakut:
Scattered architectural members around the main shrine



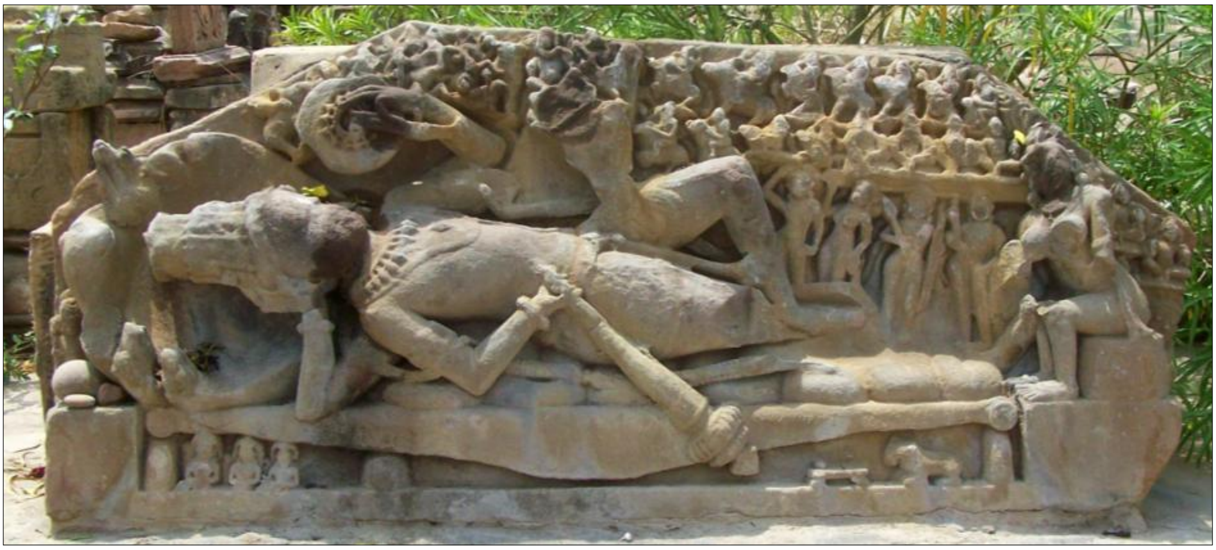
38. Someshwar Mahadev Temple, Chitrakut: Plan
(source: Archaeological Survey of India)

Sculptures

A good number of deities of Brahmanical pantheon in sculptures art are found in Someshwar Mahadev temple. Sculptures comprise various forms of Siva, Vishnu, Ganesha, Surya, Dikpala, etc. The sculptures of Siva and family deities included Uma-Maheshwar (fig. 39), Ganesa, Trivikrama, Bhairava, Chamunda, Parvati, Nandi, Siva-linga, etc. Different forms of Vishnu (fig. 40), nayikas, naga-nagis, sardula, lions, and erotic scenes have also been noticed on the walls of this temple. A large number of sculptures are scattered around the temple.



39. Someshwar Mahadev Temple, Chitrakut: Uma-Maheshwar



40. Someshwar Mahadev Temple, Chitrakut: Sheshashayi Vishnu

Conclusions

Someshwar Mahadev temple deserves special mention for its temple architecture and beautifully carved sculptures of Brahmanical deities. This temple is not only

important from the point of temple architectural study of central India but there is enough potential of conservation and excavations which may further highlight history and cultural activities of the region.

Acknowledgements

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Conservation of Cultural Heritage



Bio-deterioration and Scientific Conservation of Monuments

with Special Reference to Mahadeva and Surya Temples at Narayanpur, Chhattisgarh

** Sanjay Prasad Gupta*

Introduction

The sleepy little village of Narayanpur, 130 km from Raipur (capital of Chhattisgarh) is known for its beautiful Shiva or Mahadeva temple. This east facing temple dedicated to lord Shiva consists of a *garbhagriha* and a pillared *mandapa*. The temple is embellished with the sculptures of gods and goddesses as well as secular themes including erotic figures. Stylistically it is datable to 13th-14th century CE and one other west facing small temple with a curvilinear *sikhara* standing on a platform is dedicated to Aditya or Surya. It is devoid of ornamentation and dated back to 9th century CE (Mishra 2012: 40-41). Both the temples were built by the rulers of the Haihaya dynasty. In a scientific clearance behind the temple, a number of sculptures and artifacts excavated from the site by the Archaeological Survey of India have been displayed on the site itself. These sculptures which include Buddha's bust, Nataraja, Vishnu and other deities bear testimony to the fact that there might indeed have been the fabled garden landscaped with lakes and sculptures to welcome weary pilgrims (Roy 2009: 77-79).

In recent decades the rate of stone decay in monuments has accelerated due to adverse environmental impacts. Stone monuments with direct exposure to

environmental conditions are affected not only by physical and chemical weathering but also by biological agents of stone dwelling micro-organisms among which algae, fungi and bacteria are prominent.

Eckhardt (1978: 675-686; 1988: 71-81) reported fungi to be associated with the deterioration of stone. The deterioration mechanism of fungal penetration was reported to be both mechanical and chemical as a result of acid secretion. One of the consequences of microbial development is the formation of a pigmented biofilm that covers the sculpture and other stone structures. It is evident that the characteristics and distribution of microbial communities is dependent upon the stone design, moisture and temperature rather than the nature of the surface of different kinds of molding or components in the basement (Eckhardt 1985: 643-652; Bassi et al. 1986: 201-205; Griffin 1991: 187-208). Hence the relation between the stone design, composition and growth of the organisms, their frequency distribution in addition to the effect of climatic conditions are essential in planning for stone monument conservation.

Conservation Issues

The temples were built of sand stone, which is porous in nature. The surface deposits seem to be very old due to the formation of secondary dull green pale white lichens, which are present all over the stone surface. Due to these deposits the aesthetic beauty of the temple is seriously affected. From a scientific point of view these depositions are very harmful for the health of the stone surface, because these micro-organisms secrete an acid that destroys the sand stone.

Methodology and Conservation Strategy

Preliminary/ Sample Selection

The stone monuments selected for sampling are the Shiva temple and Surya temple (fig. 41 as on p. 46) both in Narayanpur village, 2 km from Sirpur-Kasdol main road of district Balodabazar of Chhattisgarh. Total 10 samples (5 samples from each monument) were collected from different locations of the stone monuments. Random sampling was done henceforth.



41. Mahadeva and Surya Temple, Narayanpur, Chhattisgarh

Detection of Varieties of Micro-organisms Present in the Selected Samples

During the investigation period PDA media was used for the isolation of micro-organisms. Samples were collected from the surface of temples. Few drops of sample poured in the petridishes and then these petridishes were kept at 28±1°C for 7 days for incubation (Grover et al. 2007: 93-98). At the end of incubation period fungal colonies were counted, isolated and identified with the help of available literature and their frequency was calculated by a formula mentioned below.

$$\textbf{\% frequency} = \frac{\textbf{Number of samples in which specific organism occurred}}{\textbf{Total number of samples examined}}$$

Based on the frequency occurrence the algae and fungi were grouped as rare (0-25% frequency), occasional (26-50% frequency), frequent (51-75% frequency), and common (76-100% frequency) species.

Some of the fungal species identified as common in both the temples are shown in table 1. Other non-common species found on these two temples are mentioned in table 2-3.

Table 1: Occurrence, Percentage Frequency and Frequency Class of Different Fungal Species in Two Temples

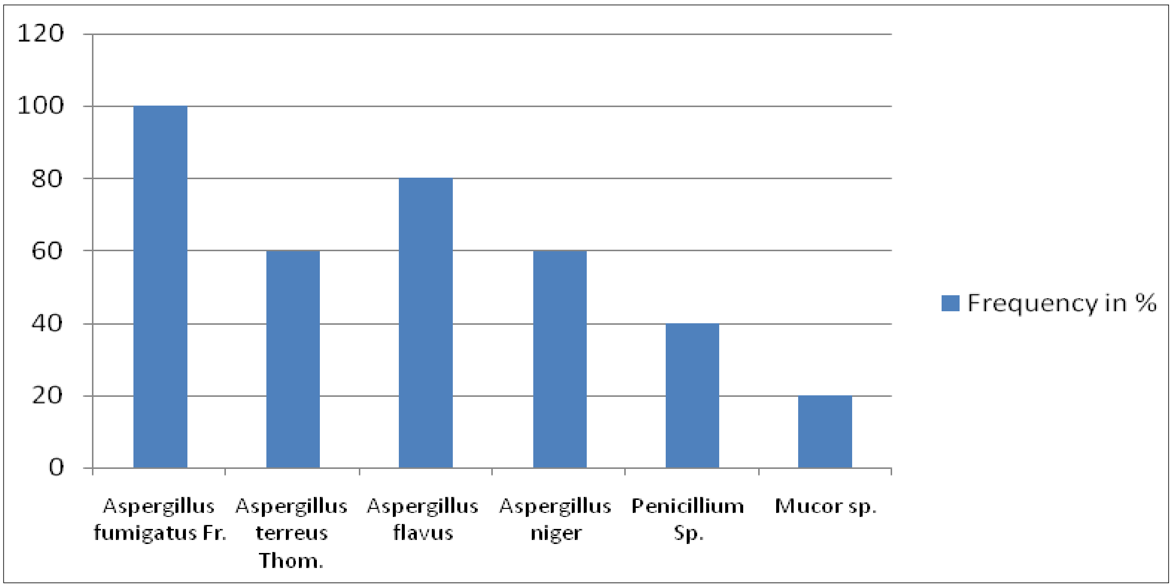
Fungal Species	Shiva Temple	Surya Temple	Frequency (%)	Class Frequency
Aspergillus fumigatus Fr.	+	+	100	C
Aspergillus terreus Thom.	+	+	100	C
Aspergillus flavus	+	+	100	C

(+) = presence of species; (-) = absence of species; C = common

Table 2: Occurrence, Percentage Frequency and Frequency Class of Different Fungal Species in Surya Temple, Narayanpur

Fungal Species	S1	S2	S3	S4	S5	Frequency (%)	Class
Aspergillus fumigatus Fr.	+	+	+	+	+	100	C
Aspergillus terreus Thom.	+	-	+	-	+	60	F
Aspergillus flavus	+	-	+	+	+	80	C
Aspergillus niger	+	+	-	-	+	60	F
Penicillium Sp.	-	+	+	-	-	40	O
Mucor sp.	-	+	-	-	-	20	R

(+) = presence of species; (-) = absence of species; C = common; O = Occasional; F = frequent; R = rare

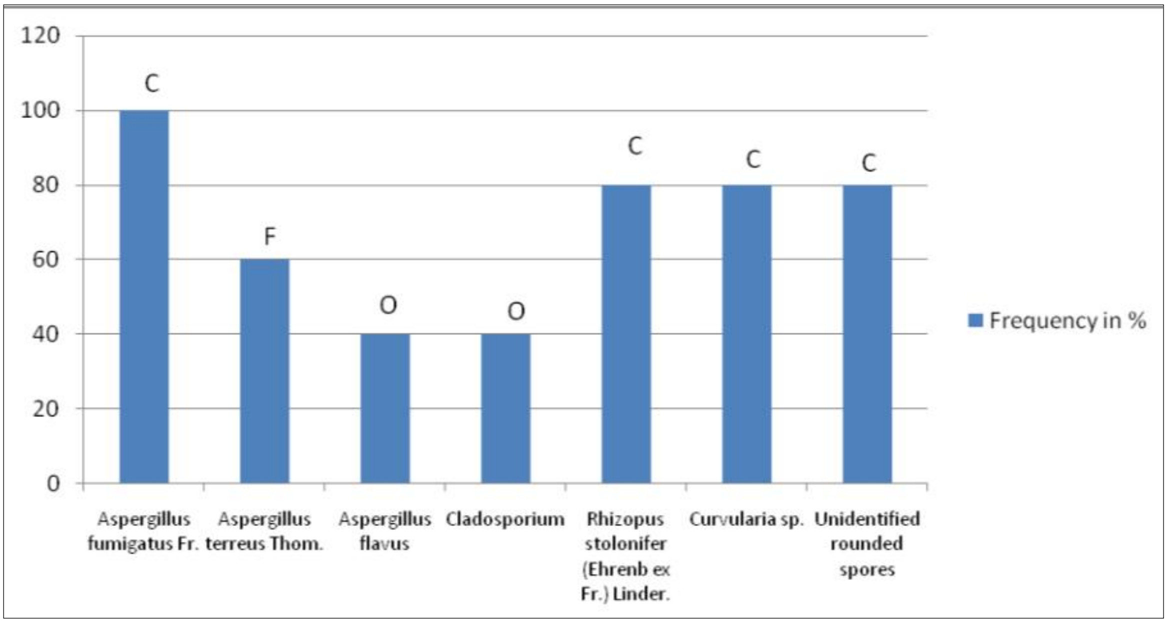


Graph showing frequency of fungal species in Surya temple

Table 3: Occurrence, Percentage Frequency and Frequency Class of Different Fungal Species in Mahadeva Temple, Narayanpur

Fungal Species	S1	S2	S3	S4	S5	Frequency (%)	Class Frequency
Aspergillus fumigatus Fr.	+	+	+	+	+	100	C
Aspergillus terreus Thom.	+	-	+	-	+	60	F
Aspergillus flavus	+	-	+	-	-	40	O
Cladosporium	+	-	-	-	+	40	O
Rhizopus stolonifer (Ehrenb ex Fr.) Linder.	+	+	+	-	+	80	C
Curvularia sp.	+	-	+	+	+	80	C
Unidentified rounded spores	+	-	+	+	+	80	C

(+) = presence of species; (-) = absence of species; C = common; O = Occasional; F = frequent; R = rare



Graph showing frequency of fungal species in Mahadeva temple

Removal of Dust and Dirt Accretion

Measures were taken by the Archaeological Survey of India for the removal of dust and dirt accretion to keep the stone in neutral pH and to preserve the stone by soft brushing. The biological agencies were removed by applying 2-3% solution of ammonia in water and by scrubbing with a nylon brush (fig. 42-43 as on p. 49). Black patches of remains of micro-vegetation deposits appeared after removal of thick layer of moss, fungi and lichens which were washed out with the help of dilute solution of oxalic acid (5%) in water because due to very deep penetration of micro-vegetation growth inside the stone, only superficial cleaning done by using ammonical solution

with the help of aid of soft nylon brushes. A diluted solution of a non-ionic detergent with liquid ammonia was applied on the treated surface to remove dirt, dust and any traces of acid and ammonia left on the surface during the chemical treatment. To stop further growth of micro vegetation, 2% aq. solution of sodium pentachlorophenate was applied on the clean, dried surface. The brittleness and powdering of stones were taken care by the application (brushing and impregnation till saturation) of an ethyl silicate based coating material (fig. 44-45), which forms a glass like silica gel binder (SiO_2 aq.) with release of ethanol (by evaporation) as byproduct. The coating of stone strengthener was applied on the deteriorated and flaky stone surface by simple brushing and impregnation till saturation (Dukes 1972: 433-438).




42-43. Mahadeva and Surya Temple, Narayanpur, Chhattisgarh: Removal of biological agencies from the outer surface



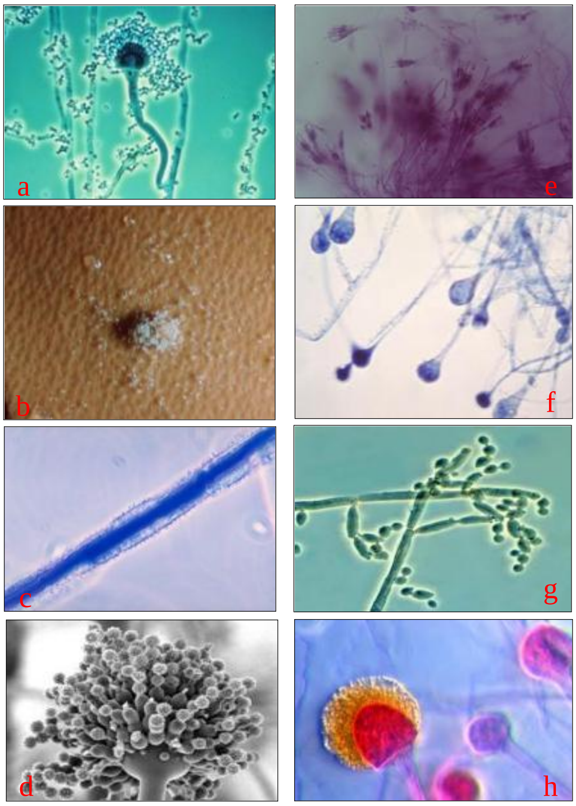

44-45. Mahadeva and Surya Temple, Narayanpur, Chhattisgarh: Application of ethyl silicate base coating on the sculptures

Preservation and Solutions

It is essential that the preservation solution applied on the monuments be of good quality. It should be colorless and transparent and must not turn yellow or become colored with age, but should be fairly stable for long period of time. It should also offer reasonable protection to the monument against moisture and its film should be hard and strong enough to protect the stone surface from damaging accretions. Therefore, for the preservation of the Mahadeva and Surya temples a silane-siloxane based compound (Wacker BS-290) was chosen, which was diluted with Mineral turpentine oil in a ratio of 1:16 and applied on the monument by soft painting brush. By using MTO as a solvent slight temporary darkening appears but preserved surface gradually get their original appearance because of slow evaporation of solvent. This compound is water proof and stops water from settling on the stone surface (*Sillicone Division Manual*: 2002).

Results and Discussions

Thirteen species of fungi were detected in the biofilm collected from both the monuments (as shown in table 2-3) (fig. 46a-h). Fungal species was found in the various location of the stone monument in a biofilm where their effect on the stone substrate led to the deterioration of the monument. These communities forming thick biofilms produced intense pigmentation varying from dark green to dark red which altered the aesthetic appearance of the stone. *Aspergillus fumigatus Fr.*, *Aspergillus terreus Thom.* and *Aspergillus flavus* fungal species are common on stone in the monument. The number of micro-organisms increased from late pre-monsoon to monsoon. In summer they turned as dry black biomass but become abundant once again with rains. Hence if this dry biomass could be



46a-h. Fungal species in the biofilm of stone monuments - a) *Aspergillus fumigatus Fr*; b) *Aspergillus terreus Thom.*; c) *Aspergillus flavus*; d) *Aspergillus niger*; e) *Penicillium Sp*; f) *Mucor sp*; g) *Cladosporium*; h) *Rhizopus stolonifer*

removed systematically before monsoon, then their growth could be arrested and minimised.

Climatic factors on rock and stone monuments in dry areas may not favour the growth of lichens but allow the colonisation of fungi. The substrate features and environmental conditions suitable for algae are also suitable for fungi except that they need additionally some organic nutrients and perhaps the initial algae growth and decay of stone to some extent helps/aids in the successive growth of fungi (Khan and Gulathuran 2010: 57-67).

Air borne fungi fail to settle on polished surfaces but the fungal hyphae can easily penetrate the porous and rough surfaces of the stone monuments. Though crevices are the favorable places, but under optimal environmental conditions colonisation on the entire surface can be seen in the monument. Through electron microscopy also found was fungi in association with bacteria widespread in deteriorating stone (Lapidi and Schipa 1973: 633-640). Earlier researchers reported that fungus first settles on the weakest zone of the stone surface whereby stating that bio-receptivity is the essential prerequisite of the stone to be colonized (Eckhardt 1988: 71-81; Sterflinger and Krumbein 1997: 219-230). In penetration phase fungus extends its hyphae into the inner part of the stone and establish as larger colonies. Hence study of distribution patterns and colonization patterns are essential in formulating conservation works. The characterization of these microorganisms and a clear understanding of their role in the process of stone decay are essential for suitable restoration interventions.

To preserve these monuments, the conservation treatment is very essential. But prior to adopting any treatment, it is particularly essential to identify the problem. The selection of chemicals should be in compliance with the problem of the stone surface and it is also must that the preservatives and chemicals should be of good quality.

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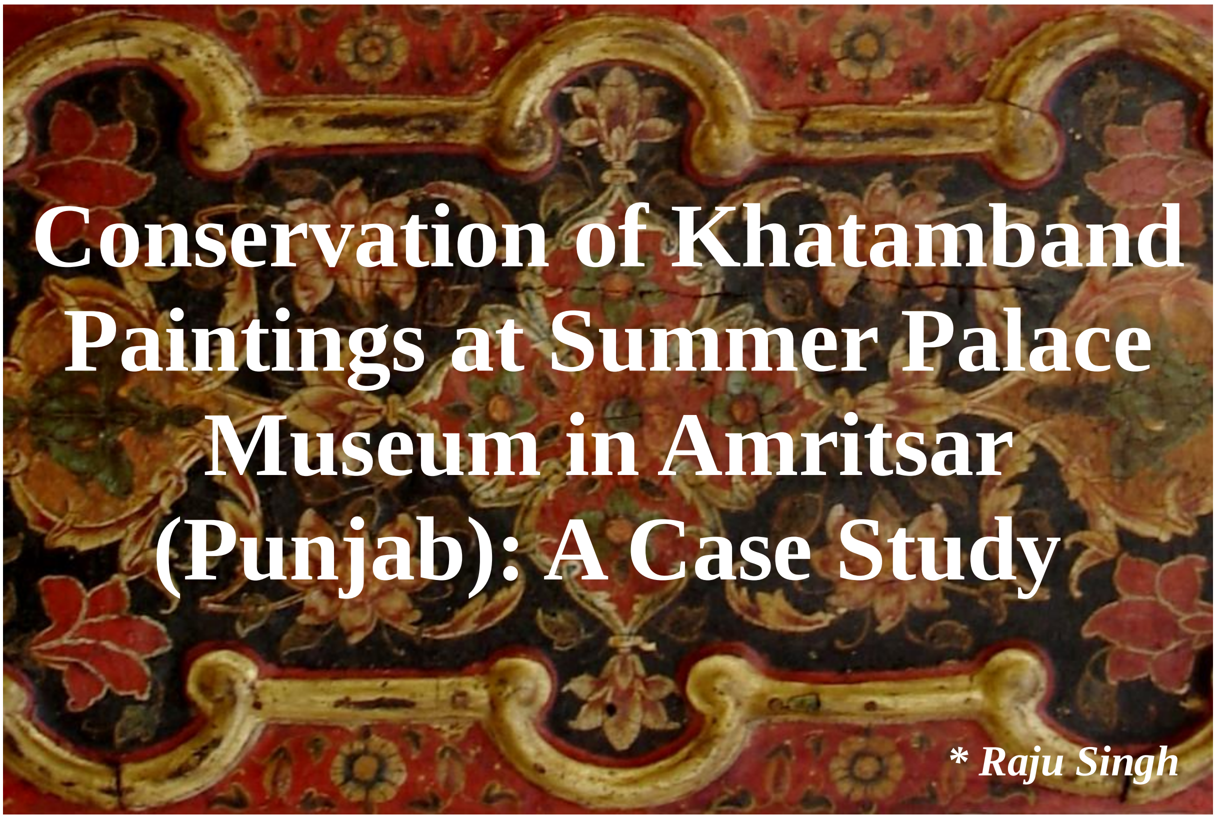
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Conservation of Khatamband Paintings at Summer Palace Museum in Amritsar (Punjab): A Case Study

*** Raju Singh**

Introduction

In order to understand and appreciate a work of art, it is important to have a basic knowledge of materials and techniques employed by the artist. The effect that the condition and previous conservation treatment has done on a painting must also be considered, because of the large impact it may show on the appearance of art work.

Many wooden objects of cultural heritage value have been susceptible to varying degrees of microbial deterioration, resulting mainly from attack of bacteria that causes erosion and tunnelling of cell walls and fungi causing soft rot of wood. Investigations based on the use of electron microscopy as a major tool has provided wealth of information on the fine texture of the degraded wood tissues at the level of cell wall, which is proving helpful in developing appropriate methods for conserving these valuable wooden artefacts.

The main purpose of conservation is to preserve art and other artefacts in such a condition that coming generations may experience and study their values. We know that conservation is defined as the process of dynamic management of change in

order to reduce the rate of decay and to prolong the life cycle of the object. Intervention should be limited, to the actions necessary to ensure the techniques and materials used, should not impede future treatments or examinations.

The present paper thus focuses on a recent conservation work of Khatamband paintings found at the Summer Palace museum in Amritsar. The Khatamband painting is a special art of Kashmir.

Amritsar: A Brief Overview

Amritsar is a city located in the northern Punjab region. It lies around 24 km east of the border of Pakistan. At present, Amritsar is the largest and a major commercial, cultural and transportation centre. Amritsar was founded in 1577 by Guru Ram Das Ji, fourth Guru of the Sikhs, on a site granted by the Mughal emperor Akbar. Guru Ram Das ordered the excavation of the sacred tank called Amrita Saras (Pool of Nectar) from which the city's name is derived (Chopra 2001).

Maharaja Ranjeet Singh who was called the "Lion of Punjab" played a decisive role in the Indian history. He also took over Amritsar in 1802 CE, and had given it the title of spiritual capital. Ranjit Singh was crowned on 12th April in 1801 CE (to coincide with Baisakhi). Sahib Singh Bedi, a descendant of Guru Nanak Dev, conducted the coronation ceremony. Gujranwala served as his capital from 1799 CE and in 1802 CE, he shifted his capital to Lahore. Ranjit Singh rose to power in a very short period of time, from a leader of a single Sikh community to becoming the Maharaja (emperor) of Punjab.

A garden was laid in 1818 CE in the north of the city as the Shalimar Bagh of Lahore, known as Ram Bagh as the name of Guru Ram Das. The museum named after Maharaja Ranjit Singh is a treasure house of matchless collection of paintings, arms and armoury, manuscripts and coins of 18th and 19th century CE (fig. 47).



47. Maharaja Ranjit Singh Summer Palace Museum, Amritsar

This was the summer palace of the king who had brought local chieftains under his control and virtually finished any possibility of attacks on the kingdom, raised by him. The palace is situated in a large beautiful garden, Ram Bagh with a lively statue of Maharaja Ranjit Singh saddled on a horse in a winsome pose. The garden was named by the ruler himself.

In the centre of the garden a double storied palace was made with a basement serving as a cool underground chamber.. The whole work of the garden had been done under the Supervision of Faqir Azzizuddin, Sardar Desa Singh Majithia and his son Sardar Lahna Singh (Bakshi 1991).

The summer palace is now protected under the Punjab Ancient and Historical Monuments and Archaeological Sites and Remains Act, 1964. It has been converted into a Museum during the 400th year celebrations of Amritsar city but it was formally established by Shri Jagjiwan Ram in 1977. The museum is an important site and cultural pride of Punjab. It is famous for its rare and priceless collection, particularly paintings, weapons, armours, manuscripts, coins, wooden doors and wooden ceiling on (khatamband) ground floor and first floor.

Before knowing the detail of Khatamband, it is pertinent to know the two broad categories of wood based on their qualities. These are -

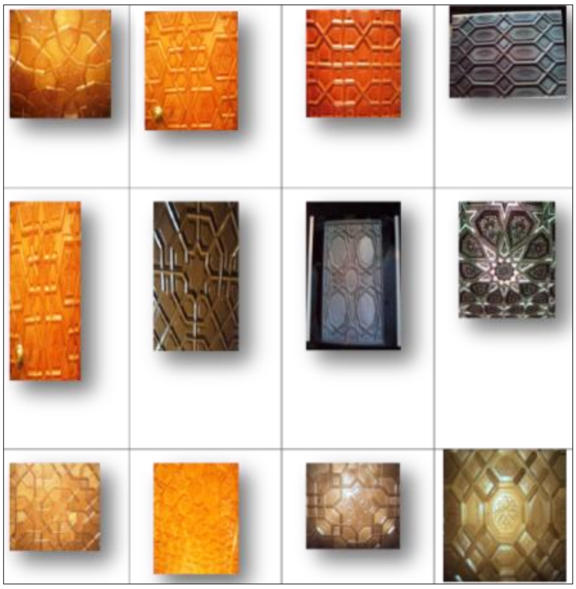
Soft Wood - It consist of two different types of cells, tracheids representing greater than 90% of the body of such wood. Soft wood consists of cellulose (40-50%) hemicelluloses (15-25%) and lignin (15-25%) usually there is some amount of extractives also present.

Hard Wood - This type of wood varies considerably in their size, and thus is of a much less uniform texture than softwoods. Hard wood consist of vessels and fiber tracheids. The hard wood contains about the same amount of cellulose as of softwoods, but less lignin and more hemicelluloses.

Meaning of Khatamband

The word '*khatam*' is Arabic word meaning "patch" and '*band*' is a Persian word meaning "lock" (kashmirnewz.com/Srinagar, Kashmir March 31, 2006). This combination of Arabic and Persian words is the most accurate translation of the word

Khatamband" literally meaning 'locking the patches' (fig. 48). The other local definition of the term 'Khatamband' is that it is a Persian word and its meaning is related to the craft *khat* i.e. drawing lines and *band* is a scale pronounced as 'khatamband'. Khatamband is a wood work, in which the design repeats a geometrical pattern with a definite mathematical calculation, held by joint and not by nails and glue.



48. Different Designs of Khatambad, meaning 'locking the patches'

The khatamband panelling gradually builds like a jigsaw puzzle into a beautiful geometric pattern that is stunningly intricate. One of the most intricate and time consuming design is the *Brah Murabba* which has around 3750 pieces in a ceiling of 10x10 feet size. The smallest piece is at times less than 40 mm or 1.5 inches. There are more than 120 known designs based on a central polygonal motif that repeats into beautiful geometric tessellations spreading over a large surface. The motifs could be a 12 sided shash or a star surrounded by 6 pohal or hexagons, as in *sheshgul* design literally meaning 'a star flower'. There are examples of some other important designs like - Dawaza girid, Chaar phool, Teen baksh, Murabba badaam, Hash kand, Gaadi daar, Hazaar garden, Sushgul, Double hash badam, etc.

Raw Material: Types of Wood Used in Khatamband

The wood used in Khatamband is mainly *Budloo* also called Sungal in Kashmiri language. It is called Silver fir in English language and has been the scientific name of *Picea webiana* or *Abies webiana*. Other types of wood such as *deodar* and Himalayan spruce were also used. Khatamband work can be performed with all the four types of woods but the most commonly used wood is the silver fir as it is cheaper, softer and easier to work as compared to the other three types.

Douglas fir (Budloo) - As wood loses or gains moisture, it will shrink or swell until it reaches equilibrium with the constantly changing level of moisture in the air. All lumber benefit from some degree of "Seasoning" i.e. letting it adjust to the humidity

condition of surrounding atmosphere before it is installed. It does not crack/split due to exposure to sun but completely disintegrate when in contact with water or moisture continuously.

Jugulans Regia (Walnut) - Walnut is one of the easiest woods to finish. It has a hard surface and beautiful colour. A clear penetrating oil finish is often the finish of choice for walnut.

Celdar (deodar) - Cedar is a light weight wood that lies flat and stays straight, which means it resists the natural tendency to crack as you might find in many other wood species. Its distinct cell structure discolours moisture rot by allowing it to dry out faster than outdoor furniture. Its bacterial and fungal resistance coupled with the fact that cedar is 80% the strength of Oak, makes it most desirable wood to use for building outdoor furniture. It’s a light weight wood and easy to handle. The wood can be cut, shaped, planned, sanded, nailed and glued easily.

Conservation Process at Summer Palace Museum

The entire Khatamband work had to be dismantled for its preservation as the termite attack had primarily affected on tiles and beadings. Before dismantling, the team decided to make a proper photographic and graphical documentation record as it is one of the important steps of conservation. In order to conserve and re-fix the painted ceiling in its original form, documentation was helpful to identify the precise location of each piece of the painted tiles and battens. A multi-disciplinary team of conservators, artisans and a carpenter was formed in order to do the work of dismantling, conservation and restoration. The upper and lower ceilings were conserved and restored using similar methodology.

Methodology

Consolidation - Due to fragile condition of painted tiles and battens, we provided facing to all the fragile tiles and consolidated all the weak areas prior to the dismantling process. Aqueous based consolidants were used for the facing. The option of providing a new facing was hence ruled out and instead temporary local consolidation of weak areas was carried out with Paraloid B72 (5% w/v in toluene) using soft hair brushes and spray. Some of tiles and battens are broken and cracked

due to mishandling and other vandalism. We use epoxy resin and PVA solution for joining of those broken painted tiles and battens.

Dismantling - The entire lower and upper layer of khatamband ceiling was dismantled very carefully by expert conservators with the help of experienced carpenters (fig. 49-50). Before dismantling the ceiling was transferred graphically by tracing with pencils on a large tracing paper. The khatamband work was dismantled piece by piece by removing nails from the beadings and battens. After dismantling, all the pieces were numbered as per their position on the tracing sheet and packed in a box for transfer to the working place. We also provide cushioning with the help of thermocol and cotton pads. Photo documentation played an important role in this and helped greatly in re-fixing of the ceiling after restoration work.



49. Maharaja Ranjit Singh Summer Palace Museum, Amritsar: Dismantling of Ceiling



50. Maharaja Ranjit Singh Summer Palace Museum, Amritsar: Ceiling assembled on ground after dismantling

Treatment

As mentioned earlier, the condition of all tiles and battens were fragile due to termite attack and other environmental factors. Therefore all tiles and battens were brought in the laboratory where cleaning work of tiles and battens was done. Soft brushes were used for cleaning the front side of the tile and hard brushes were used for the back side. Accumulation of dirt and rotted termite eaten wood was gently removed. After this, the rotted termite tiles and battens were treated for termites by application of chloropyrifos in kerosene or recertify spirit solution using with brush and injecting with syringe through holes in the painted and unpainted surface. Flaking and weak areas of paint layers were consolidated with PVAc emulsion (Fevicol) and paraloid B72.

Cleaning

At first the painted surface was cleaned with mechanical methods. For this soft hair brushes were used to remove the accumulated dust and dirt. In chemical cleaning, the method of 'Gel Cleaning' (Methyl cellulose + little Ammonia) (% of solution depends on percentage of damage and nature accretion) was adopted (fig. 51-52). The solution was applied on the front surface of painted tiles for 1 to 2 minutes and then the whole area was covered with polythene. This method was used only for enamel ceiling. Painted tiles were cleaned with Ammonia and water solution was used for cleaning the varnish. Losses in the wood were filled with a mix of fine sawdust, putty powder (French chalk and kaolin) and mix with PVAc emulsion (fevicol). In some cases the wooden support was found to be completely missing due to termite attack and human vandalism. For the missing portion polyester resin mixed with chalk was used and tapered edges were recreated. These edges were then smoothened with fine sandpaper to fit into the grooves of beadings.



51. Chemical Cleaning of surface



52. Cleaning of surface

Filling was carried out with putty powder (kaolin, Titanium dioxide, French chalk) mix with fevicol and retouching done with dry pigments using Paraloid B-72 or Gum Arabic (fig. 53). Retouching was carried out directly on the lost areas using dry pigment mixing with paraloid B-72. Wooden tiles that were totally lost were reconstructed in deodar wood in same size and shape and their painted design recreated with filling material and retouching done with dry pigment and gum Arabic medium (fig. 54-55).



53. Filling using the mixture of putty powder

After the completion of conservation work, it was planned to fix the Khatamband on a repellent ply board that will in turn be attached to architectural wooden beams (fig. 56). Work on the ceiling is currently under process and it is expected to be complete in June 2013.



54. Retouching being done by an art conservator



55. Regeneration of missing parts



56. After Restoration

Conclusions

A technical analysis and quality approach to the conservation of such a unique and significant decorative ceiling is required to understand the materials and techniques used in their making. If we look on the conservation of the other heritage buildings, we can see a lot of examples of unscientific restoration like over painting or new designs to manage the original one properly but our motto is to conserve and restore properly with minimum intervention method without hampering the artist's sanctity. This project was completed by an adequate systematic research prior to the conservation work. The method and materials used were determined by the information available on the subject and adequate facilities on the site.

It is hoped that this project can be used as a pioneer initiative and reference for future similar techniques in painting conservation. It is a stepping stone for future innovations.

Acknowledgements

I would like to thank M/s Art Conservation Solutions for giving me an opportunity to work on this project. I am indebted to Mr. Gurpreet Singh, director of Heritage Conservators, New Delhi for always supporting me. And last but not the least I express my indebtedness to my family members for their constant encouragement and support.

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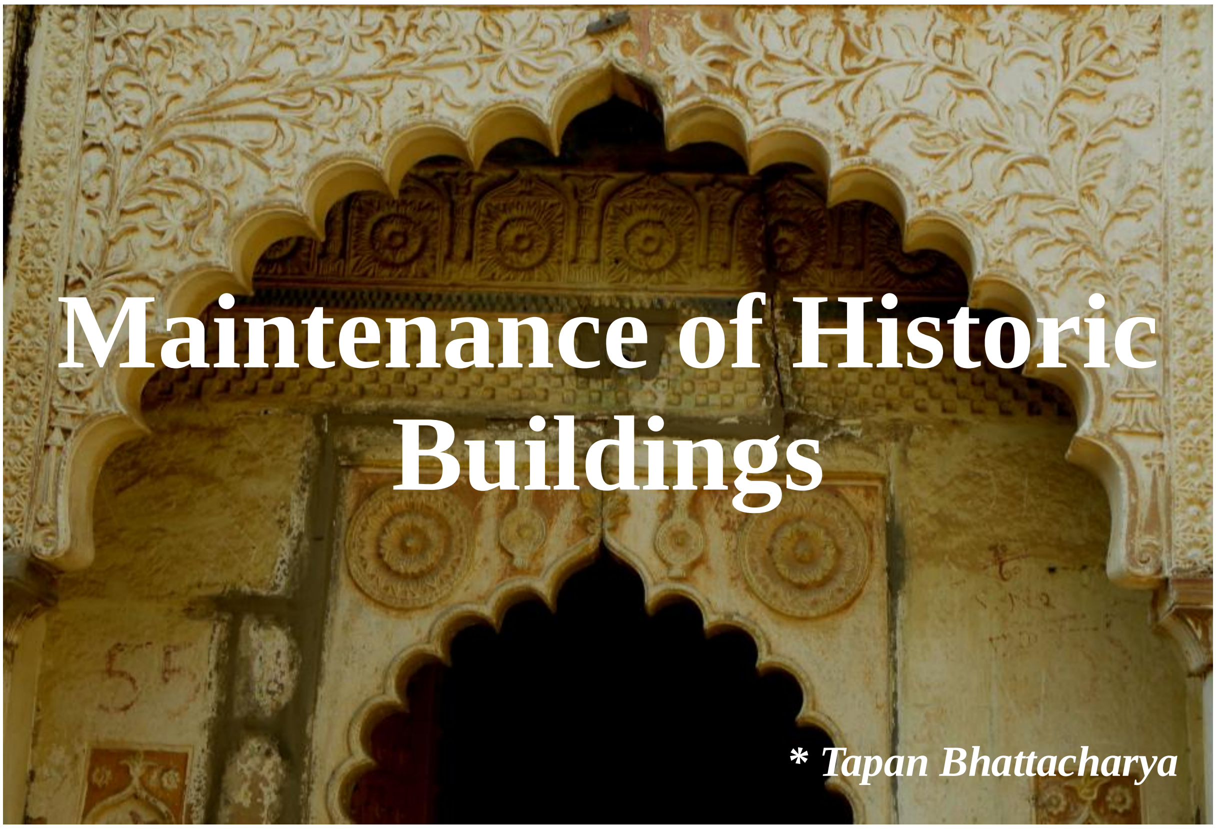
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Raju Singh, an art conservator, specialises in conservation of artefacts, manuscripts, canvas paintings and wall murals. He has worked for a number of conservation firms such as Art Conservation Solutions under the project conservation of organic and inorganic objects.



Maintenance of Historic Buildings

* Tapan Bhattacharya

The construction of historic structures was different unlike modern buildings which are built as per the specifications laid down in *Indian Standards Codes* (IS Codes) of practices. As historic buildings were built during different time periods, the techniques employed for their constructions and materials used were mostly indigenous. Different methodologies and traditional construction technologies and techniques were adopted to suit their specific needs. Naturally, the historic buildings behave differently from those which are constructed today with modern materials and techniques. Therefore, it is almost impossible to lay any standard specification for maintaining old buildings. Such historic buildings should be studied individually and dealt accordingly. The brief report highlights some of the important tips for the maintenance of historic buildings.

Inspection and Monitoring

Frequent inspections and monitoring are essential for proper maintenance of historic structures. Deteriorations and decay in different elements of a building can be seen through regular inspection and monitoring. It will help in tracking immediate problems which if ignored, may otherwise become serious or irreparable. Roof, spouts, rain water pipes and their joints, surface drains, etc. are the most important

elements of an old building which require timely inspection.

Exteriors to be Inspected More Frequently than the Interiors

It may not be always possible to check the interiors of historic buildings, particularly of those which are under religious use or accommodating museums, etc. Exterior elements of such buildings should be more frequently and regularly inspected. The interior of these buildings is generally found in better state than the exteriors. Signs of almost all kinds of structural problems like dampness, cracks, bulging, staining, etc. may easily be detected on the outer side.

Causes of Decays to be Analysed before Specifying Repairs

Common defects in old buildings like dampness, cracks, leakages, surface loss, etc. are mostly traceable by visual inspections but special efforts are required to trace and detect their causes. Identification of causes is essential for deciding the suitable remedies. For example, cracks on the walls of historic buildings are sometime caused by a rusted iron member concealed inside the masonry (fig. 57). In this case, a repair done on the visible crack will never solve the problem unless the rusted iron member is removed or appropriately replaced.



57. Muhammad Shah's Tomb, Lodi Garden, Delhi: Damages in sandstone ashlar blocks due to rusted iron member

Control of Vegetation Growth

Plants must be removed from old buildings along with the roots as soon as they appear and essentially before its roots are penetrated deep into the masonry (fig. 58). For this purpose routine inspection is necessary. The vegetation growth in close vicinity of an old building may cause moisture retention resulting in physical damage to masonry.



58. Bara Lao Ka Gumbad, Vasant Vihar, Delhi: Vegetation growth on monument

Outer Periphery Maintenance

Growth of plants in close vicinity of historic buildings should not be allowed. The ground level around the building should be maintained in such a way so that the rain water does not penetrate into the foundation. Proper levelling around an old structure would easily drain out excessive rain water.

Insect or Termite Control

Termite attacks can be spotted by regular inspections and should be treated before they cause considerable damage to building elements. It is advisable to render 'post-construction anti-termite treatments' on regular intervals as per standard specifications.

Maintaining Wooden Members

Wooden members of historic buildings should remain dry and properly ventilated. All the wooden members like beams, rafters, lintels, door-frames, etc. which are fully or partially exposed to weather, should be regularly examined. Exposed wooden surfaces should be regularly painted with permeable paints in order to constrain termite attacks. It will also prevent wooden members to penetrate moisture from atmosphere.

Dampness

Dampness or excessive level of moisture caused by penetration of water is the most common conservation problem encountered in almost every old structure. The cause of sudden dampness could be an inappropriate repair or maintenance work done to the building. The most common problem caused due to dampness is the growth of Lichens and Algae (fig. 59). On the other hand it also plays a vital role in movement of salt, resulting in loss of binding strength of the



59. Bara Lao Ka Gumbad, Vasant Vihar, Delhi: Algae/ Lichens growth due to dampness

mortar. Problems leading to dampness must be sorted out immediately as timely treatments can increase the life expectancy of historic buildings.

Cracks on Walls

In many cases, rusted iron member embedded or concealed inside the masonry wall causes outer cracks. Such cracks are generally horizontal and found at top of the doors or windows where an iron lintel was provided either by original builder or at the time of repair in later period. Similarly, a vertical crack on wall (fig. 60) might have occurred due to rusting of a service pipe made of iron.



60. Lachmangarh Fort, Rajasthan: Structural cracks on the entrance gate

To repair such cracks, the rusted iron member should be removed cautiously avoiding further damages to the wall. The repair work on the wall should be done appropriately keeping in mind the original material of the building. In an old building, it is advisable to install service pipes, etc. on surface of walls and ceilings rather than concealing them inside. The cracks on walls may also occur due to other structural problems for which investigation and repair both should be undertaken under guidance of a specialist preferably structural engineer.

Replacement of Decayed Bricks

Sometimes it becomes necessary to replace damaged or weathered bricks of historic buildings. Cutting and removing the damaged brick should be done with great care. The colour, texture and most importantly the size of new bricks should closely match with those to be replaced. Bricks of old days were often not of any standard size. It may be necessary to manufacture and procure new bricks of special size.

Decayed Stone Masonry and its Conservation

Stones are porous in nature and therefore susceptible of damages and decay by the actions of water penetration. Decay of stone in historic buildings is very common due to repairs carried out using the cement mortar. Use of hard, rigid and impermeable

cement mortar on historic buildings causes accelerated decay as cement leads to the trapping of moisture into masonry. *In situ* repairs are advisable rather than indiscriminate replacement of partially decayed stones, which are structurally sound but does not look good aesthetically due to surface loss or otherwise.

Selection of Appropriate Repair Mortar

Historic buildings, those of which originally built with lime mortar should always be repaired using lime mortar. It is essential to maintain the historical authenticity of an old building along with the structural integrity and appearance.

Maintenance of Plaster

Old plaster should be retained as much as possible by edging, grouting filleting, etc. than to replace by new plaster (fig. 61). If it is not possible to retain old plaster then only re-plastering should be considered. Cracks on old plaster can be dealt by filling. Partial detachment can also be repaired from the back of masonry walls by grouting or injecting pure lime mortar directly in the voids.



61. Lachmangarh Fort, Rajasthan: Piling of plaster on fortification due to exposure to open weather

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Lime: A Binding Material in Ancient Structures

Gurpreet Singh

The first mortars in buildings were made from mud or clay. These materials were used because of easy availability and low cost. In ancient times, Egyptians utilised gypsum mortar to lubricate the beds of large stones when they were being moved into position. However, these materials did not perform well in the presence of high levels of humidity and water.

It was discovered that limestone, when burnt and combined with water, produced a material that would harden with age. The earliest documented use of lime as a construction material was approximately 4000 BCE. It was used in Egypt for plastering the pyramids. Another example of lime based mortar is found in the majestic structures built during Roman period. Vitruvius, a Roman architect, has even provided basic guidelines for lime mortar mixes.

Lime renders were traditionally applied to give protection to walls, built of poor quality rubble stone or porous brick or to walls in exposed locations facing driving winds. Lime helped by acting like a sponge, absorbing rainfall then allowing it to evaporate rather than soak into the wall. Most cottages and houses built of rubble stone would have been rendered originally and they tend to suffer from penetrating damp if the lime render is removed or replaced with a cement rich render.

There is a very wide range of types of lime rendering as well as design detailing. Rubble walls of many buildings were often treated with just a single coat of render, amounting to not much more than a very full, flush pointing. Such a render is thicker in the hollows and very thin over the stone faces. There was no attempt to create a flat surface so the undulations of the wall and even some of the stones themselves were not concealed. For a smooth finish on more prestigious buildings, the aim would be for a more uniform render achieved by applying a scratch coat to fill the hollows and take up some of the unevenness followed by one or two more coats which were worked to a flatter surface. As a further addition to smooth plaster, several designing work were taken up by making moulding bands, minars, stucco work, etc. Depending on the kind of finish, shape and work, the aggregate size and lime proportion was selected. Such applications brought the varied use of lime mortar.



62. Muhammad Shah's Tomb, New Delhi: Restoring the lost details of minar located next to the dome



63. Mosque of Darwesh Shah, New Delhi: Finishing and smoothening of plastered surface by application of lime punning over it



64. Gateway, New Delhi: Restoration of missing ornamental lime plaster



65. Unknown Mosque, New Delhi: Restoration of *kangoora* design using lime mortar

PAST THROUGH THE LENSES

Siva Temple, Sirpur

The Siva temple located in Sirpur is a living structure. All around the main shrine, a number of sculptures can be seen either fixed in cemented platforms or on the walls. It seems that the local people have collected the sculptures from the nearby areas and installed them permanently outside the shrine. The condition of sculptures is degrading day by day as the people are destroying them by putting vermillion and rice. It is just a small example, likewise all over India thousands of sculptures and cultural properties are being destroyed by us. An immediate action is required to stop such practices. Start creating awareness regarding heritage in your vicinity. Become a protector of heritage.



Siva Temple, Sirpur: Uma-maheshwar



Siva Temple, Sirpur: Shalabhanjika



Siva Temple, Sirpur: A female deity



Siva Temple, Sirpur: Vishnu



Siva Temple, Sirpur: A panel of Navagriha



Siva Temple, Sirpur: Nataraja



Siva Temple, Sirpur: Buddha ?

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Introductory Workshop on Medieval Indian Coins
Organisers: Indian Institute of Research in Numismatic Studies
Date(s): 22nd-26th July 2013
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IIC Student and Emerging Conservator Conference
Organisers: International Institute for Conservation of Historic and Artistic Works
Date(s): 12th-13th September 2013
Venue: Copenhagen
For further information: https://www.iiconservation.org/node/3723
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Date(s): 22nd-23rd November 2013
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Deadline for the submission of abstract: 17th June 2013
For further information: http://www.kln.ac.lk/socialsciences/web/ICSS2013/
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Organisers: International Center for Research & Development
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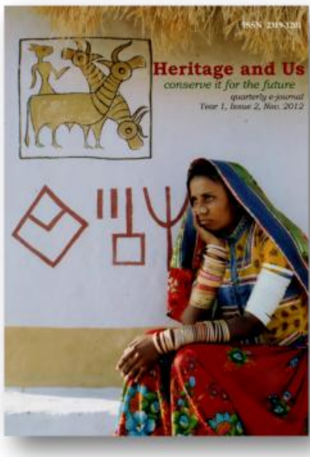
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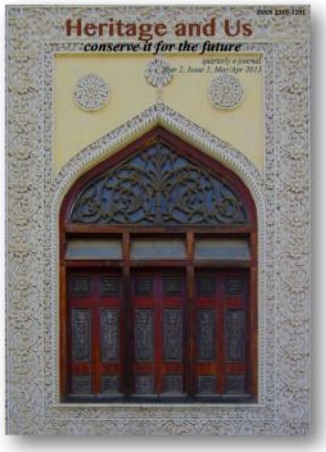
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